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MICRO-MAINFRAME LINK ANALYSIS

DOES DEC OR IBM LEAD IN CONNECTIVITY?

WINNING AT NETWORK POLITICS

BELL WARS

SATELLITES' UNCERTAIN FUTURE

SPECIAL SECTION: MANAGING LANS

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ABOUT THIS ISSUE

Networking. Connectivity. Interconnection. No matter how you phrase it, linking dissimilar systems into a coherent whole remains MIS's mandate. The skillful manager will acquire what his company needs or make the most of existing equipment, choosing communications solutions through a blend of technological and business know-how. It is the new breed of political technocrat that can keep a firm competitive in the communications age.

COVER PHOTO BY P. CHARLES LADOUCEUR

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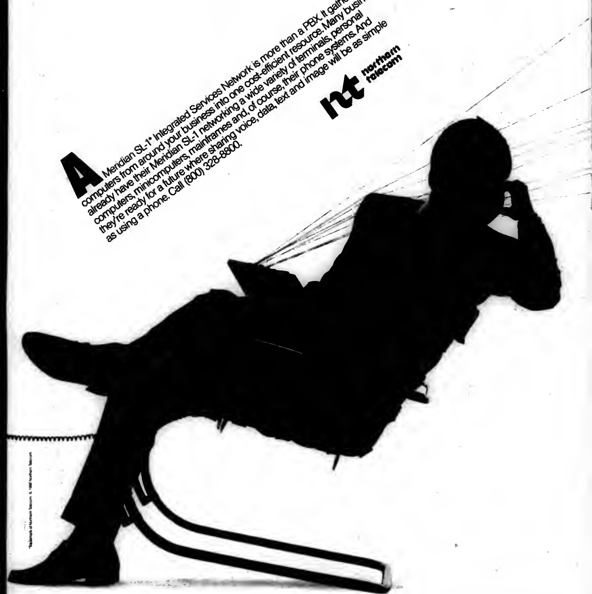

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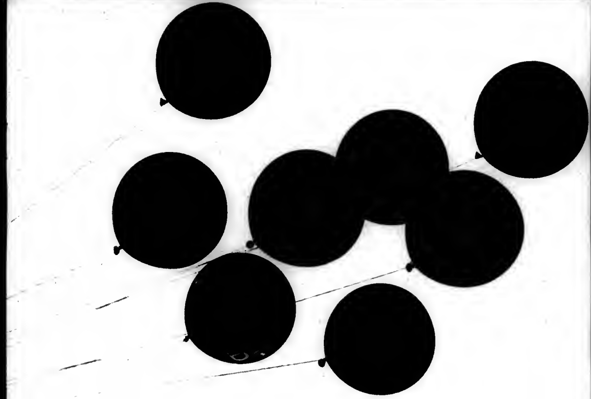

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NETWORKING

COMMUNICATIONS VIEWPOINT

EDITORIAL

The Buck Stops Here

The need to keep up with new technology continues to be the No. 1 concern among *Computerworld Focus* readers, according to our research. In few cases is this more imperative than in the communications arena. Evolving and conflicting standards as well as products and technologies that are promised but won't be available for several years all add up to a dilemma for you, the MIS manager, who will be taxed with developing an integrated system through the 1990s.

By all reports, it is MIS that is increasingly responsible for the overall communications function in organizations. A recent study by the Diebold Group, Inc. showed that 54% of MIS managers are responsible for all telecommunications in their companies and for 13% of local voice systems. In addition, the study showed that 75% of the telecommunications managers surveyed report directly to the MIS manager. As the demand for access between users and data bases and among different groups of users multiplies, it will be the job of MIS to provide this important strategic resource.

And what a job it is! Communications and network management have become a complicated hot potato that can burn the unwary MIS manager. Network management is not really just one problem but two. Not only does MIS need to grapple with the technical problems, but it also needs to overcome the political problems.

The technical issues alone are overwhelming. Capabilities must be created to manage the developing information infrastructure — but how do you do it? Deciding on the most advantageous network management product, coping with a multivendor environment and attempting to integrate voice and data are all problems on the MIS agenda for 1987. In addition, trying to decide whether to follow a single local-area network strategy or implement a number of separate networks throughout the company is a problem that needs to be addressed and resolved before further long-term decisions are made. MIS must also play the role of detective so that it can discover all the PC LANs hidden thoughout the company, a situation reminiscent of when PCs first snuck into offices.

And solving the technical problems is only half the battle. MIS must also address and resolve the political and implementation issues so no one group feels offended. There are factions that want access to everything, factions that want total access but won't share any of their own data and factions that want to maintain control of the networks and will resist any attempts to gain influence. Shared access and increased connectivity also will mean changes in work methods and, oftentimes, reporting structures in a company — never an easy task to deal with.

As increased communications brings the strategic information resource and the role of MIS to the forefront, top management will look to MIS for answers. In other words, the buck stops with you.

Ann Dooley

Lessons of PC History

INSIDER

Timothy J. Caffrey

Personal computer network technology has done a lot of growing up in the last 12 months.

The tedious debates about wiring standards, access methods and baseband vs. broadband are mercifully behind us. The high costs, normally associated with new products, are slowly coming down, although average costs per PC connection still hover around $1,000. Communications gateways, Intel Corp. 80386-based local-area network (LAN) servers and refined network operating systems are all contributing to higher levels of performance and functionality.

Importantly, progress has not been confined to systems and applications. PC LAN standards have solidified around IEEE 802.3 hardware standards for Ethernet and AT&T's Starlan, IEEE 802.5 for token-ring technology as well as software standards like Microsoft Corp.'s MS-Net (based on MS-DOS 3.1) and IBM's Netbios.

With these guidelines in place, buyers can feel more confident about the value of their LAN investment. Standards set the stage for connections to a greater variety of peripheral devices, for interconnection between LANs and for the development of more robust applications.

Overcoming a bad reputation

Despite these technical achievements, despite the adoption of stable frameworks for connectivity and despite the emergence of clear leaders in the PC LAN marketplace, PC LANs still suffer the stigma of illegitimacy. Somewhere in the minds of major buyers lurks the conviction that PC LANs are not to be taken seriously, that for real communications problems, users should look to large systems architectures for direction in systems designs and standards.

In the short term, the alternatives are lean; PC-based communications still fall functionally short of large system networks.

Most current PC LAN configurations are small (connecting an average of eight workstations) and isolated (most lack gateways to other systems or networks). Only 15% of large organizations surveyed by Framingham, Mass.-based International Data Corp. say they believe that PC LANs are effective substitutes for departmental minicomputers.

For the long term, however, the future of computing is etched on the Intel 80386, not on the IBM 3090. The PC LAN, as an extension of the PC revolution, is the arena from which the standards for price and performance in networking will emerge. PC LANs, in fact, are fueling the next step in the evolution toward downsizing, the growth of distributed processing and the decentralization of control over systems acquisition and design.

History repeats itself

Despite the long-term importance of PC LAN architectures, our large systems myopia may blind us to the lessons learned during the introduction and assimilation of PCs in large organizations. The first lessons were learned when it became clear that the number of personal computers in use far exceeded the number officially sanctioned by MIS.

The same is true of PC LANs. Despite official statements that there are perhaps one or two such networks in controlled pilot projects, most organizations hide a handful of low profile, jerry-rigged PC LANs, usually supporting those individuals who acquired their PCs in the same way.

As MIS finds out about these networks, the overriding policy response will be to crack down, to seek control through the imposition of standards. Just as with PCs, when these policies fail in the face of changing technology and economics and in light of the growing political power of individual departments and divisions, MIS will acquiesce and assume the role of facilitator and consultant.

In the brief history of PC LANs, the standards weapon has been brought to the front quickly. Inevitably, however, the battle will be lost. Small systems architectures carry the price/performance momentum that will force the hand of MIS once again.

Decentralized planning, even in the area of network deployment, is the most efficient road to more responsive and cost-effective systems architectures.

Caffrey is vice-president of Office Automation Services at International Data Corp. in Framingham, Mass.

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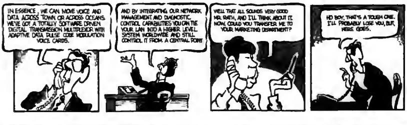
BY RICH TENNANT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AND BY INTEGRATING OUR NETWORK MANAGEMENT AND DIAGNOSTIC CONTROL CAPABILITIES YOU CAN TIE YOUR LAN INTO A HIGHER LEVEL SYSTEM WORLDWIDE AND STILL CONTROL IT FROM A CENTRAL POINT
WELL THAT ALL SOUNDS VERY GOOD MR. RATH, AND I'LL THINK ABOUT IT. NOW, COULD YOU TRANSFER ME TO YOUR MARKETING DEPARTMENT?
HO BOY, THAT'S A TOUGH ONE. I'LL PROBABLY LOSE YOU, BUT, HERE GOES.

Attention Readers

Computerworld Focus will be published 12 times in 1987. We welcome letters to the editor and publish those we judge to be of interest to our readers. Letters may be edited for brevity.

Letters should be addressed to the Editor, Computerworld Focus, 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.

CW subscribers will continue to receive *Focus* with their subscriptions.

Prepare For Financial Disaster

MANAGER'S CORNER

Jim Young

A disaster recovery plan details steps for how essential DP services can be provided to an organization in the event of a catastrophe: No doubt you have such a plan for responding to unexpected calamities.

However, many DP managers are not prepared for a more likely occurrence — financial disaster.

All too often, the DP department reacts to these circumstances only after it is too late. Top management must often mandate measures in the absence of a well-thought-out plan from DP managers. This need not occur because you can anticipate circumstances and minimize their impact beforehand.

Bad times around the bend

Plan for bad economic times because today the businesses that least expect financial surprises must sometimes face them. Takeovers or acquisitions can quickly put the most profitable company into a conservative posture. High-growth situations can be so delicately leveraged that even slight fluctuations in revenue can apply the financial brakes. Competition and even markets can change quickly. Tax laws and other legislation can have immediate impact, or management can alter spending patterns. So while some DP departments have more reason than others to prepare for hard times, all perceptive managers should at least review how they would respond to varying degrees of financial pressure.

An analysis of this type should evaluate the impact of funding at a series of reduced levels ranging from the superficial to the severe. This can be applied to various cost categories. The most obvious analysis is to review the annual budget.

However, you should study possible reductions to capital spending and their impact separately. These areas can be more critical than budgets when the financial goals are to conserve cash and not just to increase earnings. You should perform an additional evaluation on staffing levels. Some companies respond to financial troubles with mandated staff cuts or controls regardless of savings available in alternate areas. Personnel is frequently cut using a no-growth strategy, a no-replacement strategy or predetermined reductions.

There are several successive cost categories to evaluate in testing reduced general spending:

■ **Discretionary spending.** Managers should identify and itemize spending for services that can be avoided if necessary. This might include limited travel and education, temporary help and consulting.

■ **Cost-reduction programs.** Managers can reduce certain spending without giving up anything appreciable. They can consider alternate, less expensive equipment maintenance programs. Also, different financing arrangements for software could reduce future years' budgets. The savvy manager can evaluate less expensive vendors or in-house efforts for activities such as hiring or technical work.

■ **Development activity.** At some point, companies must accept that cost reduction is not just an exercise in belt tightening to get rid of superficial activity but will require the loss of substantial programs. MIS should prioritize DP development projects that represent measurable spending as well as future uses of resources with their associated costs.

In performing a cost analysis, managers should consider how projects can be deactivated. Are project teams discrete groups or community efforts? Can the projects just be abandoned or is a great effort required to dismantle and check the work? What are the real savings and when will they be realized?

■ **Equipment.** If machine capacity exists or if MIS can reduce some usage, managers could achieve equipment cost savings by eliminating or trading down computer equipment. Options can be improved by ensuring short-term lease arrangements or sublease provisions. Also, equipment contracts should economically permit early cancellation. If a firm owns its equipment, the manager should check on its value in the secondary market.

The same analysis can be performed on peripherals such as printers, disk drives, tape drives and the like. It may be possible to cut back on peripherals. MIS managers should examine lease terms to ensure that individual items can be addressed within the contract boundaries. As equipment and its costs are scrutinized, so should the uses that justify each piece or level of equipment.

■ **Staff.** Personnel is the last area MIS should examine. Are there part-time or temporary positions that can be collapsed into existing jobs? How much of a reduction would attrition alone provide? Are these the kind of losses that are desirable or acceptable?

A financial disaster contingency plan could include the following components:

- *Prioritized cost-reduction lists.* Managers should develop a prioritized list of cost reductions for various levels. They should identify all mandatory facilitating actions and consequences.
- *Timing issues.* Comparisons of long-term vs. short-term actions can give insight into a DP environment's ability to withstand a long spending drought. This will include specifics like cash-flow projections.
- *Actions.* Like a disaster recovery plan, protective actions should be undertaken in proportion to the likelihood of a problem occurring. These actions could include the way project activity is organized, the structure of internal support activities, how equipment is financed and general guidance on make vs. buy or inside vs. outside analysis.

The final recommendation is to complete this analysis with key managers in private, then file it away without sharing it — not with the department staff nor top management — because such seemingly negative thinking may not be consistent with management direction. Remember how Noah was treated when he built an ark in dry weather.

But a manager should not avoid this planning exercise. If you fail to anticipate problems, it could hurt your organization far beyond what is necessary for a proportionate scale back. Regardless of the specific direction you take, one message is clear: Be prepared.

Young is principal and director of consulting for Arthur Young & Co. in Worcester, Mass. He has worked in the industry for 15 years.

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COMMUNICATIONS VIEWPOINT

Kleinrock: Connectivity Still Users' No. 1 Concern

Leonard Kleinrock is a professor in the Computer Science Department at the University of California in Los Angeles. He is also president of the Technology Transfer Institute, a Santa Monica, Calif., company specializing in seminars for computer executives.

One of the early developers of the Arpanet packet-switching technology, Kleinrock is interested in computer networks, packet radio systems and distributed data bases.

Kleinrock recently spoke with Computerworld Focus *Senior Editor Stan Kolodziej about the growing crisis in U.S. corporate networking.*

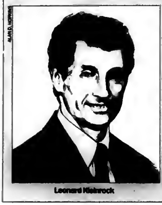
Q&A

You have predicted that networking problems will escalate during the next 10 years. Please elaborate.

A major problem [in the networking arena] is the incompatibility in the micro/workstation field where systems just can't talk to each other. Users are now developing their own personal data bases. More users want to talk to the corporate data base, and they are running into immediate communications problems. At this point, for example, the ability for a local-area network [LAN] to talk to value-added networks, metropolitan-area networks or any other networks is poor.

Value-added networks are coming in fairly quickly, and the whole T1 game has opened up now, so the whole question is how users will talk over their private network from one LAN to a LAN at the other end. There is a very difficult interaccess problem here because the protocols don't exist. The seven-layer architecture of the ISO [International Standards Organization] is a partial solution, but it has not been implemented at the higher levels in a standardized fashion.

Intercommunications is now very poor and links are slow because of the software overhead involved. Right now, the companies making software bridges and gateways are making all the money.


Leonard Kleinrock

[AT&T] tried to get into the computer market and lost big. I believe AT&T's position now is to fall back into voice, its traditional marketplace.

Is that such a bad thing?

Only in the sense that it's inefficient when users begin attaching other equipment together on networks. To do that, they have to go into many layers of protocol and storage, and it tends to be super slow. Just look at what happens in most LANs now once you pass through the higher level protocols. It just slows things down miserably. Even though the network technology is fast, the communications bandwidths are high, the process speeds are high and the response is terribly slow.

Is the number of standards in and of itself causing confusion in the marketplace?

I don't think so. Let's look at the LAN experience. There the [Institute of Electrical and Electronics Engineers, Inc.] took on the job of creating standards. It came up with three standards initially to satisfy the various vendors' demands, if you will. It created the token-ring standard, which IBM was behind; the Ethernet standard, which Xerox Corp. pushed; and the token-bus standard, which Datapoint Corp. was behind. It also created a standard for the manufacturing area, [Manufacturing Automation Protocol (MAP)].

Well, those standards haven't caused too much chaos to this point. In the case of MAP and [the Technical and Office Protocol], these originally involved specs at the lower two levels of the ISO architecture. The users, however, took things into their own hands and decided to specify their own higher level protocols for Layers 6 and 7.

Mind you, I think these standards sometimes come prematurely. In the case of LANs, standards were forced by the users and the manufacturers, but the LAN designs themselves indicate that the standards came in too quickly, too early. The reason is because there are now far better systems and access protocols from vendors that go beyond the ones that have been standardized.

Yet these standards at least allowed people to commit to the installation of LANs, even if they were not perfect, and there will be another generation of LANs coming up in short time.

Where do you see the networking market heading at the end of this decade and into the 1990s?

What's going to happen has already happened so many times before. There is going to be a proliferation of different, incompatible products, and there is going to be a shakeout. There will be two or three major vendors, and they will set the standards and call the shots. That's fine, except that it's very brutal in terms of the vendors that don't make it. And it's hard on users who purchased equipment that no longer functions and is no longer supported.

How will IBM fare in the LAN wars?

Very well. Its Token-Ring Network has a wonderful future. It has the right architecture for a large class of problems. It is IBM's gateway into [Systems Network Architecture], it supports LU6.2 and has built-in, peer-to-peer communications. IBM is betting its entire future on it in some sense, and I think it's going to go.

What about AT&T?

[AT&T] is unpredictable. The firm tried to get into the computer market and lost big. I believe AT&T's position now is to fall back into voice, its traditional marketplace. The difference is it is now going into it recognizing that packetized voice is the way in which the firm can move its voice revenue into the data communications market. I think it will try and back into data communications and the computer market through its traditional voice marketplace.

What will be the long-term effects of network incompatibility on U.S. industry?

People are already slow in bringing the latest telecom technology into their corporate plans because people are cautious. LANs and other networking facilities such as value-added networks have been accepted slowly, because, I think, users are waiting for these markets to settle. In the meantime, corporations are slowing down their immediate access to information, and there's a penalty to pay for that in overall productivity that cannot be recovered.

The big crunch, however, will be the software crisis that is going to accompany all of this. It's hard enough for single systems with a homogeneous collection of users to get their applications written in a timely fashion. When you try to get heterogeneous machines talking across networks, there is simply no software support, and I really don't know where that support is going to come from.

What about bypass technologies? Do they hold promise?

Yes. A big factor is the appearance of fiber-optic communications. The thing that made packet switching happen in the 1970s was that the cost of switching dropped more rapidly than the cost of communications, so people were willing to waste money in the switch, in the logic, in order to save money in the communications.

Fiber optics is going to make a dramatic change in that tradeoff. It's not unlikely in the next decade that we will want to waste communications to save some processing because communications, through fiber optics and other bypass technologies, is going to become very cheap.

Overall, it seems that connectivity looms large as a networking issue in the coming years.

[Connectivity] will be the driving issue and will affect the way we [design] our systems. Massive connectivity will bring massive parallel computers using small microprocessors cooperating in large computations.

There will be a whole slate of applications for parallel processing. These machines will be important because the costs of micro MIPS [millions of instructions per second] are far less than the cost of mainframe MIPS. These machines will eventually be used to run networks with much greater capacity than minis and mainframes for a fraction of the cost.

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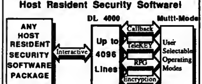
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NEWS ANALYSIS

Illinois Bell's ISDN Economics On Trial

The Integrated Services Digital Network (ISDN) took a step closer to commercial reality late last year. On December 23, 1986, a coalition of companies announced the first American field trial of an ISDN network. In the experiment, Chicago-based Illinois Bell and its suppliers provided an ISDN operation to McDonalds Corp. located in Oak Brook, Ill.

While the experiment gave the coalition new information about ISDN technology, the test's real rewards may have more to do with money. The participants hope to discover the costs of an ISDN environment and the most effective means of billing those costs to users of the service. Thus, the test could mark an important turning point in the history of the ISDN effort. ISDN is the goal of a worldwide industry effort to integrate telephone, computer and video communications on common telephone wires.

The dream is that eventually a user will be able to plug a telephone, a computer, a video monitor or other equipment into a single phone jack and have it communicate with any other wares on the network.

As little as two years ago, ISDN seemed almost impossible. But, intense standards work thoughout the communications industry has made it not only possible but real.

In 1986, there were several field trials of ISDN technology — notably in the Asian Rim nations, where such companies as Tokyo-based Fujitsu Ltd. staged large-scale ISDN networks in Japan and Singapore. (In fact, Fujitsu America, Inc., located in San Jose, Calif., is one of the main suppliers of technology and equipment to Illinois Bell.)

Functioning ISDN by 1988

The Illinois Bell/McDonalds trial is the first U.S. ISDN field test. Thus far, the test has been limited to a few demonstration calls. By early 1988, however, the participants say they hope to have a fully functioning network linking some 400 workstations at five different McDonalds' locations.

Illinois Bell says it intends to offer ISDN networks to its customers in '88. For this reason, the McDonalds' installation is considered a shake-down cruise for what the company hopes will be an important product. "We know pretty much exactly what we want to find out by this," notes Illinois Bell spokesman Tim Bannon. "We consider this more than a trial. It's a test of the basic soundness of ISDN. . . . What we hope to do is take the McDonalds' experience and project it to our other customers."

Specifically, the participants are trying to discover what is required for the long-term operation of ISDN networks. The company will be looking at such things as maintenance, provisioning (which Bannon says is "telephonese for all the legwork that has to be done prior to the installation of even one piece of equipment"), engineering requirements and the costs of an ISDN environment.

"We are going to use the trial to identify specific costs so that we can set up billing structures when we move ISDN into the full market," Bannon explains.

Illinois Bell's suppliers have similar goals. Fujitsu America's Charles Kissner, vice-president of the firm's switching development division, notes, "Technically, we already have very good ISDN technology. What we need to discover now is, first, What happens when we link all the pieces together?; and second, What is the value to the customer of an ISDN network?"

The common theme for everyone involved is that the trials have very little to do with ISDN technology as technology. Instead, they have to do with discovering how ISDN can be sold profitably. The Illinois trials thus have the look of test marketing rather than industrial research and development.

The trials suggest that ISDN is in transition. It will increasingly be considered a maturing, if not yet wholly adult, technology. And as with any adolescent, it will be concerned not with its own development but with how it will earn a living. According to Fujitsu's Kissner, "The question for ISDN is no longer whether it's technologically possibly but rather whether it's economically justified."

M.T.

Videotex Alive In Business

Videotex is alive and growing — not in the consumer market, which has become a dead zone for U.S. videotex, but, of all places, in the U.S. corporate market.

Link Resources, Inc., a New York-based market research company, says it expects corporate videotex installations to increase from about 500 in 1986 to 5,000 by 1990. This growth is not spectacular but pretty respectable for a technology that was once considered as compatible with U.S. business as oil is with H^2O.

"Videotex is simply becoming a more cost-effective, reliable way to prepare, update and distribute time-sensitive information on a regular basis, away from paper distribution," according to Bob Smith, executive director of the Rosslyn, Va.-based Videotex Industry Association (VIA). "Videotex is also being seen as an alternative to more expensive corporate electronic publishing applications. It's [also] a lot easier than trying to get data through data base

See **VIDEOTEX** page 57

COMMUNICATIONS UPDATE

Local connectivity is king in the realm of communications concerns, but international telecommunications issues are playing an important role as well.

Unify Unveils Its DBMS Scheme

With interest in local connectivity, distributed processing has caught the interest of data base management system vendors, which have begun announcing architectures that support distributed data bases. However, one vendor reports it is taking a different direction and term for its DBMS vision.

Unify Corp. of Lake Oswego, Ore., announced at the January 1987 Uniforum Unix conference in Washington, D.C., that a cooperative processing architecture will be the base for Unify products that will be announced during the next year and a half.

The difference between this cooperative processing scheme and distributed processing is one of dimension, says William Merchant, a Unify manager. "In distributed processing, data bases are put on different machines, and everything is at an equal level," he explains. "With cooperative processing, different parts of the DBMS are distributed on different systems."

Unify's cooperative processing architecture has three levels. At the first level, a user with a Microsoft Corp. MS-DOS-based personal computer or Apple Computer, Inc. Macintosh can access human interface software. If the user needs to go to a data base application, his computer will pull the application information down from a departmental computer that is linked through RS-232.

Finally, if the user needs to view or manipulate data from the data base, the data can be downloaded from the data base on a corporate minicomputer or mainframe residing on a local-area network with the departmental system.

The objective of the cooperative architecture is to utilize higher cost processing only when it is necessary, Unify's Merchant explains. Initially, the application and data base levels will only run on AT&T Unix-based computers.

Macintosh Talks To Unix Machines

Following the debut of communications products that allow Apple Computer, Inc. Macintoshes to communicate with IBM and Digital Equipment Corp. computers, a natural step would be products that permit Macintoshes to talk to Unix machines. Two companies, Eurosoft International, Inc., headquartered in Pisa, Italy, and Centram Systems West, Inc. in Berkeley, Calif., have introduced such Mac-Unix products.

Eurosoft's Macnix communications product consists of two parts. The server software residing on the Unix computer provides an icon shell that lets users move, copy or delete files and execute commands using a mouse. The client software permits a Macintosh or Macintosh Plus to download a Unix file by moving an icon from one window to another. Together, these two components reportedly provide a virtual file system that includes all Unix host files and any active Macintosh disk.

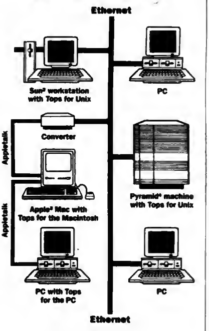
Centram's Tops local-area network supports Microsoft Corp.'s MS-DOS as well as Unix and the Macintosh operating system (see chart this page). Tops serves as a translater between different operating systems so that when a Macintosh user gains access to an IBM PC hard disk or a Unix-based computer, all the files and directories appear exactly as if they are local. Unlike Macnix, any machine on a Tops network can function as a file server or a client because Tops provides a distributed file system.

The Tops software runs over Apple's Appletalk network for Macintosh-to-PC connections and over Ethernet for Unix-to-Macintosh or PC communications. To connect Ethernet to Appletalk, users require a Kinetics, Inc. conversion box or DEC Q-bus. Centram has already signed distribution agreements with two Unix companies — minicomputer vendor Pyramid Technology Corp. and software developer Mt. Xinu The company plans to introduce Tops for other operating systems, according to Centram's President Nat Goldhaber.

The most extensive use of

See **UPDATE** page 57

Tops[1] Network Links Mac, MS-DOS and Unix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NEWS ANALYSIS

The Terminal Case Of The Dedicated IBM 3270 Machine

> ”
>
> *Research firm International Data Corp. reports that the 3270 terminal market has dropped to a stagnating 4% annual growth rate that should continue through 1990.*

The palmy days of dedicated IBM 3270 terminals seem nearly to have come to a grinding halt. Why did the mighty fall?

International Data Corp. (IDC), a Framingham, Mass., research company, has painted a dismal picture of a 3270 terminal marketplace. IDC reports that the market has dropped from an average 26% annual growth rate during the first half of this decade to a stagnating 4% annual growth rate that should continue through 1990.

Ilene Goldman, head of the Workstation Program at IDC, lists decreasing U.S. mainframe purchases in 1985 as a big factor for the 3270's decline. According to Goldman, large systems purchases in the U.S. declined 26% in 1985, while 1986 saw a rebound of only 6%.

Other reasons for the decline include increasing competition from stand-alone personal computers and microcomputers on local-area networks (LAN). Personal computers are using 3270 emulation hardware and software to access mainframe data bases, and LANs are using gateways to get microcomputer nodes into mainframes. In fact, IDC estimates that in 1985 there were 296,000 personal computers using terminal emulation packages as a means of accessing a mainframe. The research company says it expects that number to jump to 2.5 million personal computers by 1990.

PC won't completely displace 3270

"The personal computer will not completely displace 3270 sales in this decade nor in the immediate future," an IDC report explains. "The reason is that the 3270 terminal is, and will always be, a cheaper 3270 solution [compared with personal computers]. Also, not all users who interact with mainframes need stand-alone processing capabilities."

What is clear, Goldman adds, is that this incursion of PCs is changing the face of the 3270 terminal market.

"IBM is suddenly becoming very aggressive in the 3270 terminal market," Goldman explains. "During the first nine months of 1986, IBM decreased the prices on their entire 3270 line by about 20% overall and nearly 36% on some of their low-end terminals. It's putting incredible pressure on the independent [non-IBM] terminal vendors."

Goldman says that before the IBM price cuts, vendors like Telex Computer Products, Inc., Lee Data Corp., Memorex Corp., ITT Courier Terminal Systems, Inc. and CIE Systems, Inc. could stay competitive with IBM by offering terminals with lower price tags, a little more performance and extra support.

IBM wants to be price, support leader

IBM, however, is now offering three-year warranties on some 3270 product lines and, in effect, Goldman claims, is trying to become the price and support leader, "something unheard of a few years ago. The independents are going to find it hard to match this price and support challenge from IBM."

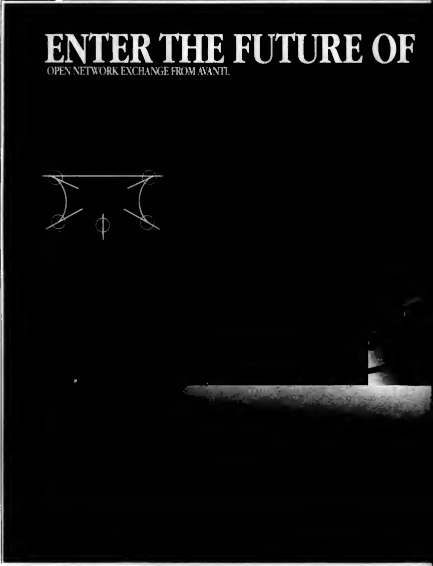
What is clear, according to Goldman, is that IBM's strategy is to go into the shrinking 3270 terminal market with guns blazing.

"IBM is going to tighten the screws a little more in the next few months by introducing two new products, the 3179 color and the 3180 monochrome terminals, which are enhancements to its current lines. With the U.S. 3270 terminal market becoming a saturated, shrinking commodity market and with sales margins decreasing IBM has to sell more, and it's not going to tolerate the independents," she explains.

Not that IBM is hurting. The company still maintains about 60% of the total U.S. 3270 terminal market, according to IDC. In the meantime, Goldman says, the independents have seen the writing on the 3270 wall and are not standing still. Most of these companies have been planning a diversification strategy for the past few years to avoid being blown out by IBM and a cooled terminal market.

"None of the main terminal players today is surviving on the display business alone," Goldman explains. "A lot of their business and revenues are coming from other data communications products like personal computers with emulation boards, T1 multiplexers and, eventually, local-area networks. They have all had to readjust their communications strategies."

S.K.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CIRCLE READER SERVICE NUMBER 227

NEWS ANALYSIS

TCP/IP Is The Solution For Users Who Want Connectivity Now

OSI Products Are Still Too Far Away

Promises, promises. The International Standards Organization's (ISO) Open Systems Interconnect (OSI) model holds the promise of universal connectivity, but it will be years before this promise becomes a reality. In the meantime, organizations that need to connect different computer models are turning to the Transmission Control Protocol/Internet Protocol (TCP/IP) network protocol developed by the U.S. Department of Defense almost 15 years ago.

"People are spending money on TCP/IP because they want connectivity now, and TCP/IP can provide it fairly inexpensively," says Steve Zamierowski, communications industry research program manager at International Data Corp. in Framingham, Mass.

The issue is that OSI is not fully adopted, says David Langlais, director of product support for TCP/IP protocol vendor, The Wollongong Group. "Today, you can't show Digital Equipment Corp. OSI products talking with AT&T OSI," he explains. "With TCP/IP, you can pop onto the Data Defense Network and test your TCP/IP implementation with others." In fact, at the 1986 Uniforum Unix conference held in Washington, D.C., more than 40 vendors' computers were connected over Ethernet using various TCP/IP products.

'There are a lot of politics'

The differences between OSI and TCP/IP acceptance are due to the architectures' ages and the groups defining the standards. The OSI model is only a few years old and is in the developmental stages.

In addition, many people view the ISO as an international committee that is trying to define what is best for the world, says Suhbash Bal, vice-president of marketing for Excelan, Inc. "There are a lot of politics with real or imaginary situations," he comments. Therefore, he predicts, the results of OSI will be good, but they will be a long time in coming.

"OSI will not be available in any off-the-shelf form for three to five years," Langlais concurs.

By contrast, TCP/IP is a mature product that is proven and reliable, Bal says. "Many of the shortcomings TCP/IP had five years ago have been cleaned up," agrees Rollo Spencer, assistant long-range technical planning manager at the National Aeronautics and Space Administration/Ames facility, where TCP/IP is used to connect computers from Cray Research, Inc., Amdahl Corp. and Silicon Graphics, Inc.

Moreover, because the DOD developed TCP/IP, it created a standard application protocol that is vendor independent. This protocol ensures compatiblity among all TCP/IP implementations, Bal explains. ISO has not yet fully addressed the applications protocol, which is the top layer of the OSI model. "I don't see any local-area network architecture taking off unless the applications can communicate with each other," he asserts.

> *'The longer OSI is delayed, the more entrenched TCP/IP will be.'*
>
> **— Suhbash Bal**
> **Excelan, Inc.**

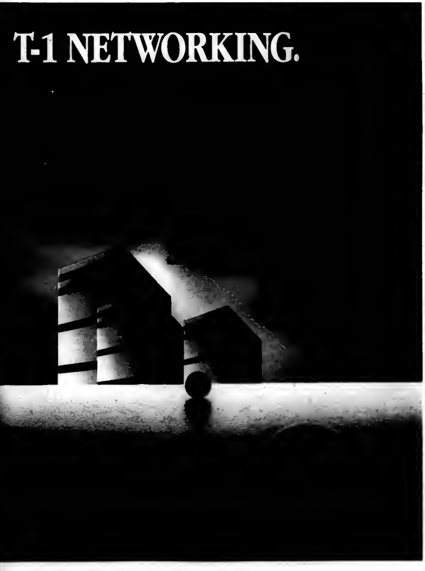
'Want something that works today'

However, analysts, users and vendors agree that as OSI matures it will replace TCP/IP. "We're well aware of OSI, and we have plans to make the transition to OSI when it is available," Spencer says. Realizing that NASA/Ames's plans reflect those of many organizations, vendors such as Wollongong and Excelan are making transition plans of their own. "Our message is that we know OSI is coming, but if you want something that works today, TCP/IP is a good alternative," Langlais says.

"In the next year, we'll begin introducing migration products," Langlais says. These products will provide a gateway between OSI and TCP/IP and will allow them to co-reside, he says. Excelan says it plans to introduce similar gateways, and both companies expect to offer full OSI-based products once ISO adopts standards for all seven layers of the OSI model. The vendors also say they intend to keep transition costs down to encourage users not to delay their networking purchases until OSI is mature.

The arrival of OSI will not spell sudden death for TCP/IP. Once the network model is mature, the migration from TCP/IP will be gradual, analysts and vendors explain. Additionally, the more time it takes OSI to become a standard, the longer TCP/IP will remain in organizations, Excelan's Bal states. "The longer OSI is delayed, the more entrenched TCP/IP will be," he concludes. "TCP/IP will only get stronger."

R.H.


T-1 NETWORKING.

Modem Mart Features Speedy Units

Modems aren't what they used to be, and for users that's good news.

There are external, internal and even portable modems now. Newer modems provide diagnostic capabilities and greater speed — up to 19.2K bit/sec. Modems that provide lower than 300 bit/sec. and even 600 bit/sec. transmission speeds are on their way out.

"Most modem vendors don't carry 300 [bit/sec.]," notes Steve Zamierowski, manager of the communications industry research program at International Data Corp. in Framingham, Mass. The primary reason for the decline of the 300 bit/sec. modem is cost. "The price difference between 300 bit/sec. and 600 bit/sec. is about $50 dollars," Zamierowski explains. Users who buy higher speed modems can quickly make up the cost difference, he says, because they save time and money on phone line connections.

In the past, modem speeds were limited to 2,400 bit/sec. on public telephone lines, but newer error-correcting protocols within the modems are allowing them to carry 4.8K bit/sec. and 9.6K bit/sec. transmissions, according to Zamierowski. Private leased lines, which charge a flat monthly rate, can handle higher transmission speeds of up to 19.2K bit/sec. Ironically, higher speeds are more important for users who do not have leased lines because public networks charge by the minute.

In response, modem vendors that make small profits on low-end modems are introducing higher end units for corporate users that need greater speed. These modems include advanced error-correcting protocols, diagnostic capabilities, on-board multiplexing options and a hefty price tag; for example, users can get a 9.6K bit/sec., four-port, time-division multiplexer modem for $5,000.

In the interest of portability

Modem vendors are also producing faster internal modems for portable computers, but these modems offer fewer features, Zamierowski notes. In the interest of portability, a few vendors have begun offering external modems that work with cellular phones.

Use of specialized and high-speed modems will continue to increase for the next few years until the Integrated Services Digital Network becomes widely established, Zamierowski says. Then the need for modems that convert digital signals to analog will be curtailed by the widespread availability of digital networks.

R.H.

MIS Can Escape Single-Vendor Rut

MIS managers' drive to abolish single-vendor solutions has suddenly gained extra momentum. Several products have recently been introduced or upgraded to allow dissimilar machines to cooperate on MIS-oriented tasks.

Current players in the heterogeneous network game include Austec, Inc. in San Jose, Calif., and Venturcom, Inc. in Cambridge, Mass.

Venturcom markets a distributed application development system known as Prelude. Written in C, Prelude consists of a library of modules that may run on a network of very different computers — as long as those machines run on Unix System V Release 3.

Because most MIS people do not work in Unix System V or C, Prelude may not be the answer to their prayers. But, for those who do, Prelude provides more than 100 separate program modules that can be parceled out among several different machines in a network. Thus, a single application could be composed of linked modules on mainframes, minicomputers and personal computers.

A company that may have more to offer individuals working in a traditional MIS environment, that is Cobol or non-Unix, is Austec, a local incarnation of Australian concern Austec International Ltd. Austec currently markets two distributed products: Acenet (formerly Acebridge) and Acecobol.

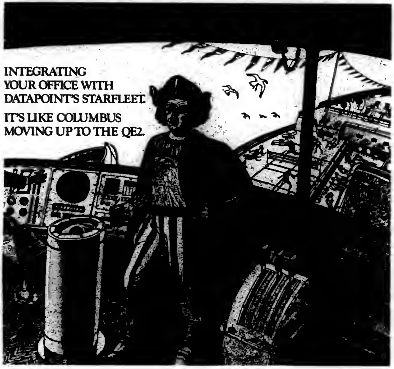
Acts as a virtual machine

Acenet sits atop the operating system of individual computers in a network and acts as a virtual machine. One Acenet node can then communicate with any other Acenet node in the network. There are currently Acenet versions of Microsoft Corp. MS-DOS, Unix and several proprietary operating systems. In a 1986 newsletter, market research firm International Data Corp., located in Framingham, Mass., reported that Acenet "has demonstrated, under independent laboratory testing, to possess capabilities that go very far in providing the user with . . . true distributed resource networking capabilities."

Acecobol, meanwhile, is a Cobol compiler for distributed environments. According to Austec spokesman Chris Lock, "It lets the user take almost any existing Cobol application, recompile it and then use it as a networked application in a network of heterogeneous machines."

The importance of products like Prelude, Acenet and Acecobol is that they vastly increase the power of the user to select or reject hardware in terms of price and performance alone. If any piece of software runs on any hardware, then customers will be no more bound to one supplier of computers than they are now to their suppliers of typing paper.

M.T.



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MICRO-MAINFRAME WATCH

Micro-Mainframe Links Reach New Heights

KEN CONDON

•BY•STAN•KOLODZIEJ•

For those in MIS who are hoping the micro-to-mainframe link market is becoming a simpler world, this article won't offer much solace.

The fact is, the micro-to-mainframe market has been multiplying during the past two years into several distinct but interrelated areas. The early link products such as terminal emulation boards and protocol converters (both showing great staying power) have been joined by newer, vendor-integrated links, extended links and products that are nearly as much local-area network (LAN) and data base as they are micro-to-mainframe link.

It is a world growing rich with choice — and potential frustration. Product categories are increasing in step with the number of corporate micro users wanting access to mainframe data. The result is a trade-off; while few MIS managers would probably wish to go back to the days when micro-to-mainframe links solely meant basic file transfer, there is no doubt there is more need for MIS to understand the market and get a handle on what types of links they need now and in the future.

"What we're trying to do now is educate our users about all the tools available with their micro-to-mainframe products," explains Paul Incao, a programmer in the Trading Systems and Technical Support division of Shearson Lehman Brothers, Inc. in New York. "We're busy putting together a full report on the direction of micro-to-mainframe links throughout the entire company. It's as much a need for us [MIS] as it is for the end users."

Seymour Merrin, a vice-president at the Gartner Group, Inc., a Stamford, Conn., research firm, claims that much of the current market confusion can be traced to both MIS and link vendors failing to realize just how difficult most micro-to-mainframe links are to install and manage.

"You have to be a real corporate professional to handle links," Merrin says. "Vendors have oversold the simplicity of links, and MIS has underestimated what is involved. The fact is, I think most micro-to-mainframe links are still very slow, and the software that is required is extremely difficult to write."

Merrin sees a dilemma shaping within the micro-to-mainframe market. At this stage, he feels, there are no link products that offer complete transparency and ease of use to end users. The software to do it can be written now but would be too expensive.

"I see some vendor storming the market with a truly transparent, affordable product, but not until 1988," Merrin says. "It will be a third-party vendor, not IBM. I don't think the IBM culture is capable of producing the big link product. Their history in software speaks for itself.

"I think one thing is clear, however. The corporate mainframe users — and not just vendors — have to be involved in producing link products. Data on mainframes is proprietary, with diverse formats. It's a totally different need than packaged [link] software can deliver."

In the meantime, however, micro-to-mainframe product sales are climbing. International Data Corp. (IDC), a Framingham, Mass.-based research group, sees the installed U.S. base of micro-to-mainframe software reaching 609,000 units shipped in 1986, up from 429,000 in 1985. IDC estimates the total U.S. market of shipped and installed link software to have reached $1.2 billion in 1986.

The U.S. terminal emulation board market is also showing few signs of flagging. IDC estimates 225,000 board units were shipped in the U.S. in 1986, up from 187,000 in 1985, and reaching 338,000 in 1987.

The market for emulation boards is still hot because the boards are far less expensive than most current micro-mainframe software solutions, generally priced at only a few hundred dollars. However, it's a case of getting what you pay for. Plug-in boards offer little more than basic file transfer capabilities.

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Shearson Lehman's Incao says that Digital Communications Associates, Inc. (DCA) Irma boards were the standard within Shearson Lehman three years ago, until IBM came out with its PC VM Bond emulation product that enables the transfer of PC files to other PCs.

PC-PC file transfer degrades data

"One of the current problems of doing PC-to-PC file transfer is having to go through the host first, which can degrade data and alter [data] formats on the way," according to Incao. "We are also bringing in Persyst, Inc. boards. I don't think it's good to be reliant on only a few vendors."

Offering more in the way of capability are file transfer link products such as Blast from Communications Research Group, Relay Gold from VM Personal Computing, Inc., and PC/SQL-Link from Micro Decisionware, Inc. These products use software resident on both micros and mainframes and enable users to restructure data they wish to extract from the mainframe.

To access data from an IBM 4381 mainframe, Hublein, Inc. in Farmington, Conn., is using VM Personal Computing's Relay Gold asynchronous communications packages.

"Most of our bigger offices are using Forte Communications Corp. communications boards on their PCs to link with the host, but the smaller offices have gone with Relay because we can use dial-up lines instead of controllers and leased lines," explains Ray Angelo, manager of the information center and office systems at Hublein. "With Relay, we can do full-screen emulation and file compression. Relay 3270 software also allows us to communicate remotely with other PCs without having to add emulation hardware."

So-called vendor integrated link products from such data base suppliers as Culknet Software, Inc. with its ICMS, Information Builders, Inc. with its Foctalk and McCormack & Dodge Corp. with its PC Link offer more sophisticated micro-to-mainframe links that interact directly with their proprietary data base management systems to provide data extract and application development tools on micros.

For example, Kerr-McGee, Inc., an energy company located in Oklahoma City, has been using PC Link from McCormack & Dodge to port data from its IBM 3090 mainframe to IBM PC XTs and streamline general ledger and payroll applications.

"PC Link has given us some major application facilities," explains Tom O'Neil, manager of Kerr-McGee's accounting systems and procedures. "The Download facility allows our users to build extraction parameters to bring down very specific mainframe records and files. We can also do some interactive uploads to the mainframe, taking some massaged data from a Lotus Development Corp. 1-2-3 application and plugging it into our mainframe McCormack & Dodge Millenium data base management system.

"The big plus," O'Neil adds, "is the ability to be selective and redefine mainframe fields, tailoring the extract parameters and only getting the data you need. I don't think you can do that with many other links."

Shearson Lehman's Incao says micro-to-mainframe links are broken into three categories at his company: coaxial, asynchronous and synchronous. Though the company has link products pertaining to each category, Incao says, it is still looking for a product that will transparently work with mainframe data directly.

"What we're seeing within the company are continuous themes of users transferring data files into Ashton-Tate's Dbase III, massaging the data and then transferring the data back to the host. One of the most transparent link products I've come across is Micro Tempus, Inc. Tempus-Link," Incao says.

Tempus-Link is part of a category of products known as extended links. These links generally combine data base extract and virtual disk facilities for microcomputer users.

Montreal-based Micro Tempus pioneered the use of a virtual disk in micro-to-mainframe links to make file transfer easier for users and relieve the mainframe CPU part of the direct micro-to-mainframe link. Virtual disks are used on mainframe virtual drives that mimic PC disk drives. Functions that can be handled on a PC drive can also be handled on a mainframe virtual drive, and virtual disks create a common working and storage area accessible to both micro and mainframe.

”

> *'I see some vendor storming the market with a truly transparent, affordable [micro-mainframe link] product, but not until 1988. It will be a third-party vendor, not IBM. I don't think the IBM culture is capable of producing the big link product. Their history in software speaks for itself.'*
>
> **— Seymour Merrin**
> **Gartner Group, Inc.**

Seattle-based Washington Mutual Savings Bank, for example, is using Tempus-Link to access mainframe data and keep up with the various stages of loan applications.

Looks like a CICS application

"It looks just like an IBM CICS application," explains Ken Osprenga, a senior programmer/analyst at the bank. "The virtual disk facility gives us the ability to handle batch micro-to-mainframe jobs by off-loading and holding data until we need it."

Tempus-Access, the newest link product from Micro-Tempus; uses DYL-270, a data extractor from Sterling Software, Inc.'s Dylcore division that reads any sequential IBM ISAM, BDAM and VSAM file structure while also interfacing with numerous DBMS such as Cullinet's IDMS, Applied Data Research, Inc.'s Datacom/DB and IBM's DL/1 and IMS.

Omnilink, an extended link product from On-Line Software International, Inc. of Fort Lee, N.J., is being used at Fabri-Centers of America, Inc., a Beachwood, Ohio, company operating specialty fashion stores across the U.S.

Before the arrival of Omnilink, Fabri-Centers' PC users had been rekeying hard-copy data from the firm's IBM 4381 mainframe into PC spreadsheets. Apart from being time-consuming, the rekeyed data was often prone to errors. According to Anthony Berg, director of the company's information center, a large part of Fabri-Centers' decision to go with Omnilink was the product's ability to be selective in downloading data.

Another extended link product making a splash is The Application Connection (TAC) from Lotus. TAC is a mainframe data base extract application that has an integrated PC query and retrieval facility. TAC is also unique in that it does not actually perform any file transfer nor does it use the host to provide a virtual disk facility.

Used with other file transfer products

TAC, however, is used in combination with several leading file transfer products including Relay Gold, Tempus-Link and Irma Link. TAC also supports a number of host data bases and file formats such as On-Line Software's Ramis II and Information Builders' Focus.

The LAN gateway market promises to make some noise in the next few years. The market for gateway boards installed in LAN PCs used as servers was projected by IDC to amount to $3.6 million in 1986, and it may climb to $12 million in 1987. The market for gateway boards installed in dedicated LAN servers is expected to be higher.

Products like DCA's Irmalan, CXI, Inc.'s Pcox/Gateway and the Net/One PC System from Ungermann-Bass, Inc. offer connectivity to various mainframe hosts through hardware and software installations on LAN PCs.

Information Builders has used a unique approach with its PC/Focus-Multiuser product, which is a LAN implementation of PC-Focus supporting multiple concurrent users. PC/Focus-Multiuser works with networks from Nestar Systems, Inc., IBM, Novell, Inc. and AT&T.

A plus for the product is that Focus applications can be developed and executed on LAN PCs or sent to the host for execution.

A more popular approach is the Net/One PC System from Ungermann-Bass that enables a PC to achieve full connectivity to a host through the company's NIUPC, a single circuit board that plugs into one expansion slot on an IBM PC or compatible, essentially turning that PC into a network server.

"I think you're going to see a lot of co-operation between LAN and emulation board companies in the future," explains Ilene Goldman, program manager of the Workstation Market Program at IDC.

"Instead of reinventing the wheel, LAN companies like Novell and others have been contracting with board makers to provide direct gateway service to a host from LANs. That type of cooperation will increase," she says.

Gartner Group's Merrin also sees LAN gateways growing in importance in the micro-to-mainframe market for economic reasons. "Truly transparent link software can be written, but it would be too expensive and would slow sales considerably," Merrin claims.

"There is an option, and that is placing the software on a file server in local-area networks and providing a gateway to the mainframe. This would help spread software costs over a number of micros on the network. I think it's the only way companies are going to be able to justify the growing prices of mainframe-based link software," Merrin says.

Looming large over the field of micro-to-mainframe communications is the specter of IBM's Advanced Program-to-Program Communications (APPC) LU6.2 communications protocol, which will eventually enable all systems on IBM's Systems Network Architecture (SNA) network to communicate directly with each other without the need of special software or hardware.

On the surface, LU6.2 would appear to make the lion's share of the micro-to-mainframe market obsolete. Not necessarily. While vendors are increasingly bringing out products supporting LU6.2, some analysts are predicting that APPC will not make a significant impact until the end of this decade.

"IBM hasn't laid out its APPC strategy yet, and we won't see full LU6.2 implementation until 1990," Goldman explains. "Even so, APPC is not automatically going to make the micro-to-mainframe industry obsolete.

"There will still be a huge aftermarket and installed base of users who will want to plug into LU6.2 after purchasing micros. PCs based on the Intel Corp. 80386 processors are not going to be providing LU6.2 right away. These 386 computer vendors will rely on board suppliers such as DCA and others to give them the LU6.2 connection," she says.

Until then, users are being confronted with an increasingly diverse range of micro-to-mainframe products. It's a big market, in large part made possible through the courtesy of IBM, which has left a legacy of heterogeneous operating environments that can't speak with one another.

DEC takes up where IBM leaves off

Integrated systems vendors like Digital Equipment Corp., however, are not complaining. DEC, for one, has lately been feasting on IBM's lack of communications foresight. The Maynard, Mass.-based company has been steadily stockpiling a series of links and gateways that tie IBM PCs into its VAX minicomputer environment and into IBM mainframes using the SNA network.

Other integrated systems vendors, such as Hewlett-Packard Co., Wang Laboratories, Inc. and Data General Corp., are also putting more emphasis on micro-to-mainframe communications in their product strategies.

Explains Mike Gayowski, DEC's marketing manager for IBM connect products: "The entire link issue is becoming very important. Any company that makes it easy to give access to mainframe data and different operating environments is going to be ahead in this game."

Kolodziej is Computerworld Focus *senior editor.*

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VENDOR ANALYSIS

DEC Leads Connectivity Race

• BY • MICHAEL • MILLIKIN •

With users demanding connectivity, IBM and Digital Equipment Corp. are vying for the lead in the interoperability race. Both are on the fast track, pursuing the goal through different means.

On one side there is DEC, the darling of the connection set, embracing universal standardization to help it pull ahead. On the other is IBM and the force of Big Blue, relying on a combination of its own networking solutions and outside standards to make it the champion. In a contest that will be fraught with political implications, users may find that they are the biggest winners of all.

The circumstances of the computer industry are familiar to us all. Because end users in a multivendor world want interconnectivity, no vendor in its right mind would now come out in favor of a closed, proprietary architecture. Openness is the watchword.

There is some very real money to be made by vendors that can satisfy user demands. In the long term, a global network will be possible — computers will have the same interoperability as the telephone system. But in the short term, the vendor that can provide better interconnect solutions will gain market share.

The question is, of course, what rules to follow. IBM's Systems Network Architecture (SNA) is a dominant standard. Smaller vendors that want to play interconnect must provide a solution that taps into SNA. In this manner, two smaller vendors' products may be able to communicate through their IBM interconnect products.

SNA could become the common protocol language of computer communications. The alternative is to create from scratch an agreed-upon standard that would play Esperanto to IBM's English. When connecting to IBM on SNA's terms, other vendors always have to catch up. Hence, a lot of furor revolves around IBM's delays in publishing the specifications of its protocols.

If all vendors agree on a planned language, then they are on an equal footing. That planned alternative is realized in the International Standards Organization's (ISO) Open Systems Interconnect (OSI) suite of protocols.

DEC is assuming the mantle of OSI champion and for more than just altruistic reasons. The vendor recognizes the bias implicit in relying upon SNA as a standard. Not content to follow in anyone's shadow, even an enormous Blue one, DEC made the correct logical leaps. After putting its IBM interconnection products in order, it jumped on the OSI bandwagon.

The sides are clearly drawn. DEC leads the rebellious multitudes beneath the OSI banner. IBM stands in opposition, truculently trying to maintain its dominance even as its empire crumbles. Or so the fable goes.

IBM is in a slump. Weak financial returns and a lack of interoperability among its own strategic systems underscore the perception that IBM has stumbled. And, in fact, Big Blue is losing market share in the departmental computing arena, primarily to DEC. Today's favorite industry pastime is debating whether IBM will open its architecture further in response to increased market pressures or whether it will slam the door shut.

Conspiracy theories aside, IBM has a very good business reason to endorse open architectures. The more devices that IBM can connect to, the more million instructions per second its processors will use and the more revenue IBM will bring in. Add to this the fact that closing architectures would only force more customers to rebel and damage IBM's sales figures further.

Has DEC's success with interconnection driven IBM to adopt a more open stance? Such statements are at best difficult to quantify and are at worst a matter of opinion. However,

VENDOR ANALYSIS

DEC's success and IBM's stance are certainly symptomatic of the current demands of the marketplace.

It appears that IBM has committed itself to open architectures and is pursuing this goal with its four-point plan:

- It will continue to expand its advanced-function architectures.
- It will publish the specifications to these architectures.
- It will support international standards development.
- It will implement accepted international standards.

One key point in this plan is the publication of specifications for the SNA architecture. Some vendors have long complained that these specifications have not been available quickly enough or with enough detail to make them easy to implement. But IBM's first priority is to develop new advanced protocols for internal use.

Although IBM is beginning to open up its architecture, it has no desire to become a development laboratory for the rest of the industry. Publishing its specifications, a considerable task, must be done with great care lest IBM find itself ensnared in yet another legal tangle.

(A current European lawsuit takes IBM to task over what is an architecture and what is an implementation of that architecture. Essentially, the plaintiffs are trying to force IBM to give them some of its actual code on the grounds that it was characterized as part of IBM's architecture rather than an implementation of that architecture.)

SNA has a reputation for rigidity and complexity. But in keeping with the times, SNA is becoming more flexible and less hierarchical. Reduced definition is now an important feature. In the past, users had to make changes to their network definition off-line in batch mode, but this is not practical in a large network. Routes can now be selected when a session is initiated without being defined in advance.

DEC is assuming the mantle of OSI champion and for more than just altruistic reasons.

Additionally, IBM brought out its Low Entry Networking (LEN) extension to SNA, which supports easily managed, peer-oriented networks. The first product within LEN is the Advanced Peer-to-Peer Networking (APPN) announced in June 1986 for IBM's 370, System/36 and 38.

APPN supports dynamic expansion of the network without service interruption, dynamic rerouting and a distributed data management architecture. All of these components are necessary if IBM is to meet its goal of cross-system consistency and interoperability.

Big Blue, after all, has a terrible interconnectivity problem within its own disparate product lines.

In addition to the peer-to-peer protocols, IBM is working on SNA Network Interconnection (SNI) and Extended Network Addressing (ENA). SNI enables two separate SNA networks to be connected into a single logical network in a manner that is transparent to both network administrators and users. SNI can also be used to split a very large network into more manageable domains, which IBM does with its own Information Network service network.

ENA provides a complementary feature by extending the number of bits that can be used to describe a network node in a very large network. Today, IBM provides 23 bits for this purpose but has room in its protocols for up to 48 bits — enough for an overabundance of SNA addresses.

As far as participation in international standards goes, IBM is damned if it does and damned if it doesn't. If IBM stays aloof, it will be accused of trying to sabotage or delay the process. A standard can hardly be universally accepted if the largest vendor ignores it. On the other hand, if IBM does participate, it may be accused of trying to shanghai the process.

For example, some factions within ISO earlier approached IBM and requested that it propose that its LU6.2 be included in the OSI specifications at the session layer.

IBM agreed and made the proposal, only to see it torpedoed by anti-IBM rhetoric from other ISO factions. Whether the LU6.2 issue is dead depends on whom you talk to.

A second example of IBM's travails in this arena is its history with the Corporation for Open Systems (COS), which was formed in March 1986. At the time COS was formed by its 18 original members, IBM was expressly not invited to participate. Most observers jumped to the conclusion that IBM was once again trying to sabotage a worthy cause. In May 1986, COS graciously decided to let IBM join after all, which IBM did amidst a flurry of stories about how it was dragging its feet.

Although IBM has kept a low profile in ISO, it has been active in the organization from the beginning.

A standard can hardly be universally accepted if the largest vendor ignores it.

In fact, Big Blue and other deep-pocketed companies such as AT&T tend to flood the committee rooms with bodies. IBM has 70 of its top people from affected business areas spending part of their time on ISO.

Much of IBM's ISO work, however, is in Europe, where its business need for ISO support is the greatest. In La Gaude, France, IBM has an ISO-compatibility certification facility and has completed implementing the ISO transport and session layers (the fifth layer of the ISO model). In Heidelberg, West Germany, IBM has a research center for OSI Levels 6 and 7 and expects to have these implemented by year-end 1987.

IBM has probably done as much to support and implement ISO as any manufacturer. Unfortunately, it has done so quietly and only in areas in which it has absolutely needed to.

So far, IBM has made little attempt to bring its ISO implementations home, thus leaving the vendor open to criticism that Big Blue only participates in the ISO for three reasons: It wants to influence the ISO's direction to its benefit (the LU6.2 affair); it wants to hedge its bets; and the politics of Europe give the company no choice.

IBM also supports X.25 via its X.25 SNA Extended Interconnection (XI) product, which enables an X.25 transport, public or private, to be substituted for the first three layers of SNA. But as is the case with ISO support, IBM has grudgingly sold X.25 SNA XI in the U.S. only when it has had no other choice.

OSI squares off with SNA

Regardless of any standards work, SNA is still IBM's strategic networking product. Although IBM will make gateways to OSI available in a timely fashion and will sell OSI solutions on a case-by-case basis. OSI will by no means supersede SNA. IBM will continue to market and invest in SNA for the long term.

IBM's basic approach to OSI is to coexist with it by providing gateways. DEC, on the other hand, is loudly proclaiming that it actually plans to integrate OSI into Decnet.

This means that Decnet will offer a much more open and efficient multivendor networking environment because other vendors with OSI networks will be able to connect with native protocols and not through a gateway to SNA. Gateways cost money, and they strangle performance.

Interconnectivity hype aside, IBM and DEC offer two choices. IBM pushes SNA — with its increasing functionality and flexibility — as its champion, but offers coexistence with the standards world. DEC embraces these standards and integrates them into its own networking architecture for increased performance and economy. The next few years should be very interesting.

Recognizing that support for multivendor networking would become a basic criterion for continued success, DEC began positioning itself with its IBM interconnection products several years ago. These packages, DEC claimed, let DEC connect better to the IBM world than IBM could.

The IBM interconnection packages satisfied a market demand and helped DEC establish a position as a supporter of multivendor networks in a world in which IBM set the dominant standard.

Besides, every other vendor was jumping on the IBM interconnect bandwagon. Had DEC not established a leading role in this area, it would have made it all the harder for the smaller vendor to challenge IBM's hegemony as successfully as it has already done.

But at the same time, DEC began planning its OSI work. In the late 1970s, interest in OSI was more academic than practical. By 1982, as it implemented Phase IV of Decnet, DEC was eyeing OSI support as its next step.

In the long run, IBM's support for OSI will relieve DEC of a burdensome engineering problem — that of keeping up its suite of IBM interconnect products. OSI will be the common industry language.

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CIRCLE READER SERVICE NUMBER 248

VENDOR ANALYSIS

Currently, DEC says, it has four things reinforcing its position as OSI advocate in the industry. First, the company has a clearly stated strategy — to integrate OSI into Decnet. Second, it has already established itself, both with sound products and persuasive public relations, as the industry connectivity leader. Third, it participates in industry standards organizations and forums. Fourth, DEC's management, from Chief Executive Officer Kenneth Olsen down, has a clear vision about OSI's strategic value.

In June 1985, DEC issued an aggressive statement of direction, basically laying out a challenge to itself and to competitors. DEC promised the following:

- To produce an OSI transport layer product by early 1986.
- To announce an X.25 offering by the end of 1986.
- To deliver a Manufacturing Automation Protocol (MAP) 2.1 product by the end of 1986.
- To announce an X.400 product by the end of 1986.
- To integrate the lower four layers of OSI into Decnet by 1988 in a nondisruptive manner.

DEC is ahead of its own schedule. The VAX OSI Transport Service (VOTS) appeared in February 1986. DEC followed up early this summer with the X.400 message router gateway and VAX Packet Net Switch Interface (VAX PSI), an X.25 product, and Release 1.1 of VOTS. DEC also produced the OSI Application Kernel (Osak), an OSI Layer 5 product not mentioned in the June statement.

Taken together, these products help DEC set the pace of OSI. VAX PSI covers Layers 1, 2 and 3. VOTS 1.1 sits across Layers 3 and 4. Osak resides at Layer 5, and the Message Router X.400 gateway covers Layers 6 and 7.

At Autofact '86 in November, DEC introduced its MAP 2.1 product. This OSI suite is not a finished set of products. DEC wanted to be the first to set an example. Why the haste? The battle is between the de facto standard set by IBM with SNA and the de jure standard of OSI. Clearly, it is in DEC's best interest to have buyers perceive OSI as viable, and what better way than to have products running in an OSI environment?

A smooth transition

DEC's ultimate goal is to enfold the OSI layers so smoothly into Decnet's layers that users receive the benefits of both — the multivendor interconnection of OSI, the value-added features of network management and so on. OSI applications will benefit particularly from such an arrangement, as DEC's own features can fill the gaps in which the laborious standards process has not yet been able to define specifications.

Messaging is a good example. While the X.400 specifications for the envelope are fairly well set, standardized definitions for directory services are still several years away. In the interim, DEC's own directory services kick in. DEC's message router transparently handles the directory tasks for exchanging messages with other X.400 systems, compliant public mail networks and other Decnet networks using VMS mail, All-in-1 Mail or other mail systems and applications that access the router.

Not that this strategy of stressing value-added products on top of a standardized foundation is unique to DEC. But DEC is very strong in areas in which other vendors and OSI implementations are weaker. The synergy between DEC's version of SNA, called the Digital Network Architecture (DNA), and OSI will create a fruitful marriage for the next few years.

What's on deck? Suites of upper layer OSI products such as File Transfer Access Management and application-specific protocols are expected next. DEC will keep pace with the developing standards, such as office document architecture and office document interchange format.

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> *Customers, of course, are the long-term winners in this connectivity race.*

Standardization, to a certain degree, requires adherence to a lower common denominator of functionality. On a plot of functional innovation against time in networking architectures, the Decnet plot would be steeper and run above the OSI standards' plot.

Customers, of course, are the long-term winners in this race. SNA adherents will end up with more flexibility and power. OSI backers will have their global standard and thus interconnection without the performance degradation of gateways. By establishing itself as the leading advocate of OSI, DEC stands to gain against IBM in the current market. More important for DEC's continued success, however, is the continuing growth of OSI as a viable alternative to SNA.

Standards work is as much a political process as an engineering one and can bog down for very human reasons. DEC is aware that it needs to keep its weight behind the wheel to keep it rolling. ■

Millikin is an associate editor with Patricia Seybold's Office Computing Group in Boston, which specializes in departmental and work group computing. He has been in the industry for four years and is an editor of "Patricia Seybold's Office Systems Report" *and* "Patricia Seybold's Unix in the Office."

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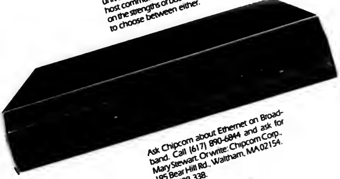

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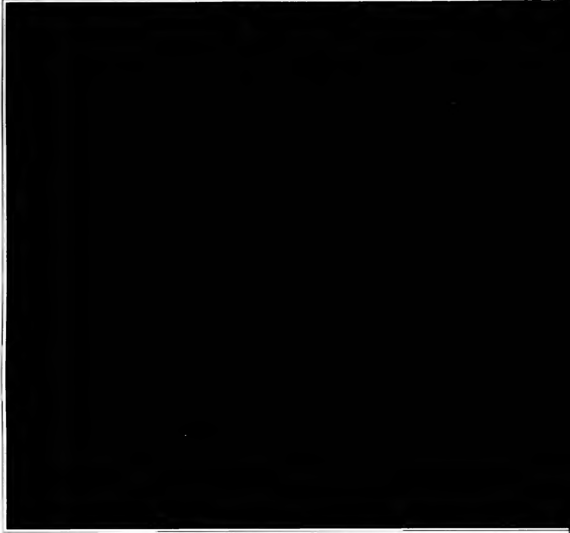

P CHARLES LADOUCEUR PHOTO

Untangling Network Politics

• BY • MICHAEL • TUCKER •

Remember when data communications was going to be the salvation of MIS? By the simple expedient of wiring everything into the same network, MIS was going to cut costs, improve service, win the hearts and minds of chief executive officers everywhere and finally get those pesky IBM Personal Computers under control.

Instead, MIS soon found that data communications brought its own unique set of problems. And, guess what? Those problems were not purely technical. Beyond the complexities of cables and protocols, networking creates an entire set of political concerns.

First, the islands of computing in a corporation — engineering, sales, the office of the micro manager — may have absolutely nothing to gain from a bridge to the mainland. Indeed, the various island kings, the executives who have built power bases by being independent, will correctly regard data communications as a threat to their positions.

Second, and much worse, in an age of mergers and acquistions, MIS people are coming into conflict with one another. As companies, and so their data networks, merge, MIS executives who may have invested thousands of manyears in the creation of proprietary networks are finding their own positions very delicate indeed.

In both cases, MIS people discover that the best defense and offense is to acquire the marketing and diplomatic skills necessary to manipulate network managers as much as the networks themselves.

Data communications have always presented MIS with the potential for conflict. Early in the game, when communications was coming under the control of specialized executives, many analysts suspected that MIS faced a real threat from an emerging class of corporate network managers.

However, in recent months, that threat seems to have abated, with MIS gradually absorbing communications functions. "The trend we see is data communications and MIS coming together, with MIS winning most of whatever battles occur in the process," notes Jeff Kaplan, director of communications industry research at Framingham, Mass.-based International Data Corp, a market research firm.

Kaplan argues that this MIS victory is a logical outcome of the nature of MIS technology. "The requirements of data communications are so complicated that the people who have been doing it for years on mainframes — MIS — tend to keep on doing it with micros and minis."

However, if MIS has won the communications mandate, it now finds that communications itself has become the issue. As MIS people go into their organizations and attempt to link personal computers, minis and mainframes into one coherent whole, they are encountering serious resistance.

A software vendor tells a particularly instructive story about one of his clients, a large East Coast investment firm. Since everyone involved would rather not be identified, the vendor likes to call his story a fable rather than history.

"We went into the place with an accounting package. Everything looked good. We had a great relationship with the MIS director, and she was really behind us. Then, we got into trouble. You see, there was this guy, a specialist, who'd been hired in the early 1980s to bring PCs into the operation. And now, it was like his personal little kingdom. I mean, he had a rule that no one was supposed to even look at a manual unless he himself had personally read it, cleared it and issued it to the staff."

The vendor's product was supposed to be a networked application. "This guy took one look at our product and just went ape. He wanted nothing on 'his' machines that even looked like a link to the mainframe."

Finally, the MIS director was able to get enough support from her CEO to go around the specialist, though not to defang him completely. "They kind of walled him up in his office. His authority was restricted to just those PCs that were already in place. New purchases came under the authority of MIS."

As a result, the investment firm now has two independent systems: a networked collection of mainframes and newer Personal Computer AT-class machines and an aging set of stand-alone PCs. The two groups cannot communicate except by the physical transfer of disks or by bootleg modems and terminal emulation products supplied by the PC users themselves.

Still, the MIS officer is relatively content. Time, after all, is on her side. Eventually, the specialist's PCs will grow obsolete. The MIS officer's network, on the other hand, will grow larger, more complex and more powerful with every passing year. Morever, the MIS officer is finding allies among the specialist's end users, who chafe at his attempts to restrict their technology. Subverting the specialist with things like bootleg modems has become the company's leading indoor mass participation sport, exceeding even the office football pool.

The moral of this fable, the software vendor says, is *politics*. The MIS director was successful because she was an expert politician, not because she was a technologist. She gained the support of her superiors by aggressively marketing networking as the answer to the company's information-related prayers.

At the same time, she was able to gain the loyalty of end users by presenting herself as their advocate and, thus, neatly claiming the traditional populist appeal of the micro manager for herself. And, concludes the vendor, it is these political, not technological, skills that MIS people are going to need most in the wiring of their organizations.

However, this particular MIS director had some advantages that many people in her position do not. Specifically, she was able to outflank her rival because he had already done much of the work for her by alienating his superiors and his users.

A far stickier situation occurs when an island of computing or independent data network has support at the executive level but must be integrated into a larger system anyway. The stickiest of that already stickier wicket probably occurs when one large company acquires another. In that case, a data network that may have functioned perfectly for years and that has the support of local management and end users must suddenly be merged with the data network of the buyer, which, in an age of leveraged buy-outs and junk bonds, may actually be smaller and less sophisticated than that of the acquired firm.

Transamerica Corp., a San Francisco-based insurance and financial services corporation, has been in the buyer's role since early last year. As a result, its DP division, Transamerica Information Services, headquartered in Las Vegas, Calif., deals frequently with the politics of network integration. "I must admit, we have had some potential for problems in acquisitions," says Gary Ho, Transamerica's director for data communications. "Integration has to be approached with some tact and with sensitivity."

Ho's operation supplies that sensitivity in two ways. First, Transamerica Information Services is set up to make its clients feel as independent as possible. "We run our data center like a separate company," Ho says. "We're run as a pseudo-business within the corporation. We even bill our customers. We treat them as though there were competitive alternatives to us."

E. F. Hutton Talks Politics

The best way to deal with political problems in networking is not to have them in the first place.

New York-based investment and financial services firm, E. F. Hutton & Co., is one company in which this happy situation exists. Hutton came late to information systems, and when it finally decided to invest in computers, it did so with the full participation of DP experts at the highest levels. As a result, says Bernard Weinstein, Hutton's first vice-president in charge of systems and communications, "we were fortunate enough to adopt an information strategy that dealt with these kind of problems from the beginning."

Hutton had unique requirements for its computers, not the least of which was security. As a company dependent on its brokers' contacts, it could not afford to let a disgruntled employee simply "dump a customer list to a floppy disk and walk out of the building with it," Weinstein explains. Therefore, he says, "we looked at PCs and realized we could be spending a lot of money for something that might get out of control. So, we designed a system that filled all the firm's personal computing requirements but with fewer PCs."

Hutton does this by putting most of its brokers' PC applications on multiuser systems. "We looked at the different software packages that were wanted," Weinstein explains. "Then we arranged for the companies that produce them to port the software over to our local branch processors." At each desktop, the end-users have a terminal or a diskless PC.

"The real revolution here," Weinstein says, "is in providing end-user computing without end-user computers. In effect, we avoided political problems with a preemptive strike."

However, Weinstein admits that his position is somewhat unique. Most MIS people are not coming into a firm that does not already possess a large installed base of PCs and PC software. Moreover, Weinstein says, there are situations in which those computers simply cannot be integrated into any larger systems. "I'm a pluralist in these things. I think every organization has to look at its own communications requirements, its organization and its culture. In an engineering firm, for instance, where you might want to put an engineer on a pedestal, our system would be far less successful."

— Michael Tucker

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And, second, Transamerica Information Services then sells itself to those customers. "You have to convince them that [integration] is a good business decision," Ho says. "You have to show them how it will improve their service, their performance, their flexibility, the ability to expand . . . while reducing their costs. Basically, you have to show them how *you* can make *them* money."

Indeed, selling is as important to Ho's philosophy of integration as physical interconnects.

It is important to remember, though, that Transamerica is dealing from a position of strength. It is a buyer rather than a seller, and its information processing division can afford to be tactful and sensitive. If Transamerica Information Services comes across a particularly unyielding network manager who simply refuses to buy no matter how sweet the deal, the firm can simply fire him.

The other end of the stick

What, though, of the MIS person who is on the other end of the stick? The person who, after what may have been a heroic effort to install a companywide data network, discovers his employer has been acquired in a flurry of junk bonds?

MIS people in this position report that their careers suddenly depend on the degree to which the takeover is friendly. Or, more precisely, their jobs depend on the degree of independence the buyer is willing to allow its purchase to have.

If that degree is small, then the MIS people involved many times have little choice but to accept a demotion. They go, essentially, from being the rulers of their own shop to someone else's assistants. In very grim situations, they may even have to scrap the data network they have so painstakingly developed and install someone else's less sophisticated system.

How MIS people should respond to such developments depends on how easily they can adapt to a new employer. If the purchasing corporation is relatively open and has room at the top, then they might best be advised to swallow their pride, sign aboard the new ship and attempt to regain (or even surpass) their old position in its DP operation.

On the other hand, if the corporation is not open to new talent, then the most productive thing they can do may be to resign. "How am I handling it?" asks one MIS person, whose company was recently acquired by a larger and much less friendly corporation, "Well, I smile a lot, drag my feet as much as possible and look for another job."

But, if the acquiring companies allow a larger degree of independence, then the acquisition process can be relatively painless. There is, however, a price: A company may inherit an entirely new set of political problems. The MIS manager has to become something of a diplomat.

For example, a food products combine, Nestle SA, located in Vevey, Switzerland, acquired San Francisco-based coffee vendor Hills Bros. Coffee, Inc. in 1985. The purchase was part of Nestle's larger strategy of obtaining food and food service companies in the U.S.

The manager of communications at Hills was then, and still is, Roger C. Prow. He reports that as Nestle's U.S. investment grew into several loosely related firms, the company moved to network them but allowed them to continue to exist as independent entities. "What they have done," Prow says, "is set up a data communications committee of the Nestle companies in the U.S. to see what can be done to produce a joint network."

The data communications committee functions almost as if it were an industry standards effort. And, as with any standards effort, there are all sorts of questions to be worked out like who has to change what and who has to pay for it. "The biggest hassle you get into is how you charge the cost," Prow says. "If your Nestle company has to upgrade your communications front-end so it can talk to some other Nestle company, who pays for it? . . . Right now, it's pretty much 'If you have to do the upgrade, you have to pay for it.' "

It may be that eventually the Nestle companies will settle their networking problems by surrendering some independence. "At present, we're splitting the cost," Prow says. "If we put in, say, a new line, 50% of the cost is paid by all the Nestle companies and 50% is charged to the companies that actually use it. But, in the future, we may work it out by going to Nestle USA and saying, 'Okay, this is going to be out of your pocket.' "

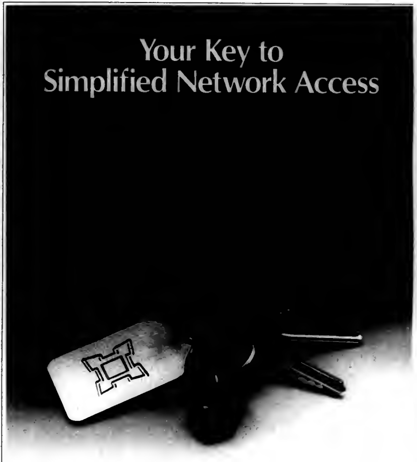
MIS takes on new roles

Thus, MIS people are unraveling the politics of networks by taking on the new roles of diplomat, marketer and office warrior. New roles, that is, for MIS officers working at an operational level; executive-level managers have played all three and more since the beginning of organizational behavior.

In fact, even a quick glance at what is happening to MIS in the networking world reveals a grander theme. Data communications is merely one of the many areas in which MIS is making the transition from a technical profession to an administrative one and in which the MIS director is being replaced by a new creature, the chief information officer (CIO).

What that situation will mean for MIS remains unclear. It is, however, certain that MIS will have to learn an entirely new set of skills, of which politics will be only one aspect. And the education may not be particularly pleasant. According to one information officer who has successfully made the transition from MIS director to CIO: "The difference between a CIO and an MIS director? It's simple. You burn your bridges behind you. You learn to think company. And sometimes that means leaving MIS way, way behind." ▣

Tucker is Computerworld Focus *features editor.*



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TELECOM TRENDS

Bell Wars

BY T. DOANE PERRY

The world of corporate communications is split in two, between the voice switching and transmission hemisphere of the telephone manager and the data processing and data communications hemisphere of MIS. As the business communications system becomes more of a strategic necessity than a cost center, corporations will seek ways to coordinate the pieces of their communications operations and make them responsive to shifts in business direction.

The phone companies, which traditionally served the slow-growing but huge voice needs of telephone managers, would love to sell data goods and services into the smaller but faster growing arena of MIS. In light of this scenario, what can MIS and the chief information officer (CIO) reasonably expect to get from this strategy of the local telephone companies?

The regional holding companies and divested Bell operating companies are viable vendors because they will be around for a while. Besides the inherent strength that comes from dominating the local loop of the communications infrastructure, they have also made themselves financially strong. Furthermore, the divested companies are staffed with competent, energetic people; however, these firms also have many less competent people left from the days of monopoly market service.

The postdivestiture, deregulated (and reregulated) regional holding companies and their local operating companies have at least four organizational problems:

- The long chain of command necessitated by their large size.
- A horizontal split between holding and operating companies.
- A vertical split among the operating companies within each holding company.
- A vertical split between the regulated and unregulated sides of each holding company.

For example, the Centrex systems supported by the 22 divested operating companies within the seven holding companies are not generally compatible with each other.

But even with these problems, the divested companies are bursting with entrepreneurial business plans. One operational difference between the data and voice worlds is the importance of long-range planning. The telephone companies do a lot of planning because their enormous physical plant is expensive to upgrade and migrate. At data and computer companies, which are forced to zip around in faster moving markets, long-range planning is done by people who are either about to retire or who have been kicked upstairs.

Because these companies lack research and development operations, a chief thrust of their planning is to acquire other firms. And it is the strategy of a great many start-up datacom firms to make their fortunes by being acquired by a phone company.

The phone companies proclaim they will make acquisitions strategically to avoid becoming scattergun conglomerates with a smorgasbord of offerings. The central notion is to acquire software vendors that can enable the companies to offer gateway services that make existing systems work better together. But given the breadth and diversity of their responsibilities and opportunities, the phone companies have to work hard.

The holding and operating companies' chief problem is that their power, ambition, energy and competence is limited by a set of constraints. The most publicized constraint is pro-competitive regulations that curtail the turf on which the companies can operate — and rightly so because the phone companies do control the local loop, which is a so-called bottleneck in the nation's communications system.

A lesser known restriction is the brief experience of most telephony people outside the monopoly markets — where the rationale was to spend more on plant and equipment to maximize return on investment as allowed by the Federal Communications Commission.

A final constraint is a certain prejudice in the datacom world against personnel with telephony backgrounds. The prejudice originates from a different way of thinking about requirements — telephone people think of switching through a central circuit to charge for a piece of the business; datacom people think of sending packets through a distributed system of clear pipes. That's one reason why some data-oriented people see the Integrated Services Digital Network as a notion with telephony origins that is the wrong approach for data.

The FCC's Computer Inquiry III, one of the main regulatory proceedings now affecting the divested firms, represents both a major stumbling block and a source of relief. For example, when the Ameritech regional holding company recently announced a plan to invest in David Systems,

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Inc. to obtain equipment that would improve the data handling capability of Ameritech's central offices, the holding company's competitors immediately cried foul on the grounds that the move would amount to manufacturing, from which the phone companies are prohibited.

Many a good telephone company business plan will trip on regulatory hurdles. The question, given that the divested companies are viable vendors and that they have ambitious business plans, becomes, Can they pull it off?

That question cannot yet be answered with certainty, but it is fair to say that those companies with the right mix of personnel, organization, regulatory relief and acquisitions will do well.

While there is some doubt whether the telephone companies can achieve their new mission even though they are aggressive and fiscally strong, MIS and the CIO must discover what goods and services the divested companies will offer and how good these offerings will be.

MIS and the CIO will likely surmise that the companies are best at high-quality, low-cost data communications transport, such as X.25 packet switching, switched 56K bit/sec. alternatives to point-to-point pipes and IBM's Systems Network Architecture (SNA), because they have low incremental costs and do not have much more to learn in this mart.

Many of the phone companies hope that by adding network intelligence they will be able to increase their traffic by enabling customers to do without some of the hardware that users now need to support SNA and packet switching. Network intelligence means various combinations of processing power, protocol conversion, gateways and use of data bases.

However, phone company competitiveness through modernization is threatened by changes in the regulation of rates of equipment depreciation. After the May 1986 Supreme Court decision, conservative depreciation rates set by state public utility commissions will replace aggressive rates allowed by the FCC.

Regulation blues

The Supreme Court's depreciation ruling shifts the balance of regulatory initiative and momentum toward state utility commissions and away from the FCC. The regional holding companies and divested operating companies face new forms of regulation, particularly through accounting measures rather than further deregulation.

MIS and the CIO will also find that the phone companies are a good place to buy customer premises equipment (CPE), especially wiring and switches such as private branch exchanges and key systems and particularly equipment bundled for one-stop shopping with transmission services like T1.

The phone companies are going to be best at serving the medium-size customer market because that area is their traditional customer base. Low-end products like key systems have not sold well through the telephone companies.

The phone companies have lost money — an estimated $500 million, or 7% of after-tax profits, in 1985 — in their nontelephone ventures, particularly in CPE subsidiaries. No phone company is at the break-even point yet in CPE sales. An estimate submitted to the FCC by the North American Telecommunications Association puts the firm's losses at $1 billion.

Reasons for the losses include slow growth of voice/data integration markets and duplication of sales staffs. The stock market does not think the regional holding companies can earn more from unregulated diversifications than from regulated operations. For example, Southwestern Bell Corp.'s shares dropped sharply when Southwestern announced its $1.65 billion acquisition of Metromedia, Inc.'s cellular telephone and paging business.

> ”
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> *Many a good telephone company business plan will trip on regulatory hurdles.*

Another area into which the phone companies will venture is the large, evolving arena of systems integration, which encompasses the activities of network design, implementation, operation, management and service.

The high road for systems integrators is to claim "vendor independence" — that they meet the needs of their customers with whatever vendors' gear is best suited to local conditions. For example, 30% of Michigan Bell's customers are in manufacturing. As a systems integrator, it would design and install central office local-area networks for interbuilding requirements and in each factory.

The regional holding companies are well positioned for the systems integration market because they can leverage their low-cost information transport capability. But whether the phone companies can succeed in systems integration is debatable because this field is the most complex and data oriented of the phone companies' business objectives. Success will require new levels of flexibility in management as well as considerable integration of their own internal systems.

In the systems integration and other markets, the phone companies are belatedly beginning to realize that their greatest competitor is AT&T. For example, the phone companies are teaming with systems integrator Martin Marietta Data Systems and equipment vendor Northern Telecom, Inc. to bid against AT&T for a $4.5 billion federal telecom

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procurement called FTS 2000.

Also, the divested companies are trying to avoid dependence on AT&T for central office switch hardware and software. The telephone companies will increasingly go offshore for suppliers.

A related strategy is that the telephone holding companies have increased their direct purchases of telecommunications equipment and have developed or refurbished warehousing and distribution facilities to assist their local operating companies in reducing the need for rate hike requests and to position themselves as suppliers to large corporations with extensive private networks.

The phone companies are much alike in terms of the range of businesses into which they have gone. Besides the local exchange carrier business, a standard list of new business enterprises for the seven regional holding companies includes the following ventures:

- CPE and office automation equipment sales.
- Mobile communications.
- Directory publishing and advertising.
- Property management and real estate.
- Equipment financing and leasing.
- Venture capital development.
- International business.

In general, the phone companies are proceeding cautiously and are not responding to users' requests for proposals that call for large amounts of data communications. They want to get some experience with datacom and some sense of where the market is before they add value to their networks.

However, each regional holding company is different in terms of which businesses it emphasizes.

■ *Ameritech.*

Ameritech is lagging behind the other regional holding companies' equipment subsidiaries in getting into the office automation business. The company is, however, pressing very hard for permission to enter the telecom equipment manufacturing business and the long-distance business.

In August 1985, it was the first holding company to seek Department of Justice approval to enter those fields. Ameritech bought Applied Data Research, Inc., an international software firm specializing in IBM mainframe applications.

■ *Bell Atlantic Corp.*

Located on the mid-Atlantic seaboard, Bell Atlantic has a disproportionately large percentage of major government users, many of whom use Centrex services. This somewhat unique customer base motivates Bell Atlantic to address the needs of those users by rapidly enhancing switched network capabilities. It is also making a strong commitment, largely via acquisitions, to the business of selling and servicing computers and terminal devices.

■ *Bell South Corp.*

The Sun Belt is on an economic upswing, and Bell South has one of the largest construction budgets to keep up with growth. Its conservative acquisition and diversification policy keeps it out of the headlines, but the company has a strong reputation for technological leadership. It is foremost in offering fiber-optic technologies and packet-switched systems.

■ *Nynex Corp.*

Bypass is a major threat for Nynex. Fortune 500 headquarters and communications/information-intensive industries like banks and information companies saturate its marketplace, and most are likely bypass users. The company is striving to make its local loop more attractive and keep customers on the network.

However, Nynex is also willing to build a bypass system rather than lose a user's business. Nynex has made a major commitment to sales of telecommunications and computer equipment with its Nynex Business Information Services Co. and its Datago retail stores.

■ *Pacific Telesis Group (Pactel).*

Pactel has put major emphasis on international involvement. Although its primary efforts are focused on the Pacific Rim countries, it has established a foothold in Europe with the acquisition of Kensington Datacom, Inc., a British electronic messaging firm. The success of cellular radio in the Los Angeles area has convinced Pactel to commit $431 million to the acquisition of Communications Industries, Inc. and to the future of cellular operations. Pactel has also purchased a chain of retail computer stores.

■ *Southwestern Bell.*

Southwestern Bell continues to place top priority on the local exchange and "plain, old telephone service." For its growth in unregulated business, it has staked out *Yellow Pages* publishing. Its aggressive moves into the high-margin directory publishing could prove to be the most profitable of all the regionals' diversification efforts.

■ *U.S. West.*

U.S. West is the most aggressive and successful advocate of broad-based deregulation of local telephone services. Regulators in the U.S. West region were the first to deregulate Centrex-type services, intra-Local Access and Transport Areas private lines and toll. The company is striving not merely for detariffing but for total freedom from regulatory oversight.

MIS should keep an eye on the regional holding companies. These firms are becoming viable vendors providing valuable services, in particular data communications and equipment as well as systems integration. As regulations ease, the holding companies and their respective operating companies are well positioned to grow. ■

Perry is a senior telecommunications consultant in the Communications Group for International Data Corp., a Framingham, Mass., market research firm.

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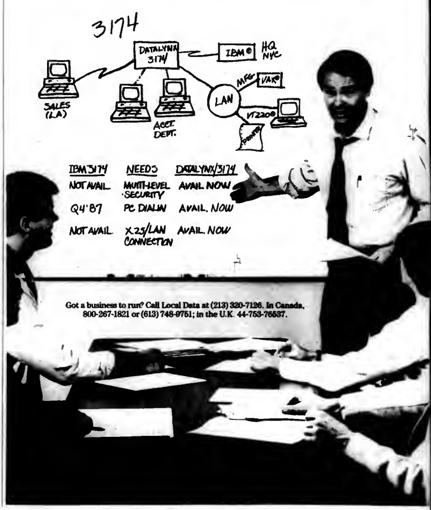

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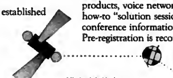

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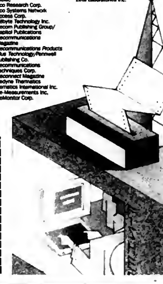


TECHNOLOGY UPDATE

The Fax Market Takes Wing

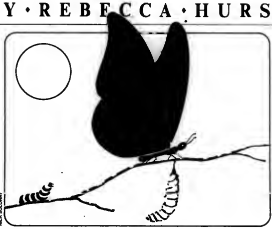
• BY • REBECCA • HURST •

Mention improved technology, standards and ease of use, and the first thing that comes to mind is not likely to be facsimile machines. Yet all these qualities describe the faithful fax that has served corporations since the mid-1960s.

These same qualities are contributing to a surge in fax purchases after nearly 20 years of slow, steady growth. Fax shipments have risen to 157,000 in 1985 from 89,000 in 1984, according to Julie Weiss, telecommunications group analyst with San Jose, Calif.-based Dataquest, Inc. The 1986 shipments are in the neighborhood of 190,000 to 195,000, she adds.

Future growth appears equally strong. The U.S. facsimile market will reach $1 billion in 1990 from $525 million today, predicts Nancy Erskine, program director for the corporate publishing strategies service at the Gartner Group, Inc. in Stamford, Conn. This growth will come not only in Fortune 1,000 companies in which faxes already have a stronghold but also in small- to medium-size firms and even in the home-based consumer market, analysts agree.

Among Fortune 1,000 companies, a thrust toward decentralization is expanding the market for facsimile machines. Until recently, businesses customarily used a single, central fax, often located in the mail room. But, recently, corporate purchasing managers reported that they didn't know how many facsimile machines they used, says Leslie Townsend, senior consultant for International Resource Development, Inc. in Norwalk, Conn. "They didn't know how many faxes they needed because the faxes were coming out of department budgets."



NICK SOLOWAY

Faxes are enjoying burgeoning growth in small- to medium-size companies that employ between 20 and 250 people. There are approximately 697,000 such firms in the U.S., according to the Statistical Abstract of the United States, 105th Edition released in 1985. These numbers represent a huge potential market because companies are increasingly becoming aware of the faxes' capabilities and are able to afford the faxes as their prices come down.

Facsimile vendors have also begun penetrating the consumer market within the last year, she reports. Although there are some 10 million home industries, such as consulting and catering businesses, according to Dataquest's Weiss, this new market is still very small.

To attract smaller companies and the consumer market, facsimile vendors are using new packaging and distribution channels. Some vendors are beginning to offer low-end facsimiles that are small, portable and available in decorator colors such as pink and white, Townsend says.

Other vendors are turning to retail. For example, Canon U.S.A., Inc. is targeting its Faxphone 10, a combination facsimile and telephone, toward home business use, Weiss reports. To reach potential customers, the company is selling the Faxphone 10 through The Sharper Image, a catalog sales company that specializes in gadgets.

The impetus behind the fax's growing popularity is a combination of standards, education, pricing and features. Unlike many communications media, facsimiles have adhered since 1968 to a single set of standards developed by the Consultative Committee on International Telephony and Telegraphy (CCITT).

Though the standards are divided into four groups, CCITT has defined each successive standards group so that all facsimiles adhering to the CCITT standards can communicate with each other. As a result, companies or departments can purchase a facsimile knowing that it will work with the great majority of other fax units in use today.

Education about faxes has increased business's awareness of the machine's potential. "Fax vendors have invested a lot of money in educating people," Weiss says. Canon and Ricoh Corp. have full-page advertisements in *The Wall Street Journal*, while AT&T has radio ads, she notes. The Federal Express Co.'s Zapmail promotional campaign has also contributed significantly to business users' awareness of faxes, analysts agree.

However, Zapmail, one of the most visible fax services, recently became one of the market's few casualties. Federal discontinued its popular but unprofitable Zapmail service in November 1986.

Zapmail's demise will not have a long-term impact on the facsimile market, Weiss maintains, because the market has already gained critical momentum. In the short term, Federal Express will functionally compete as a fax vendor. "The company had taken delivery on a large number of fax units before canceling its Zapmail program," Weiss explains. In addition, Federal Express is expected to sell several facsimile units to the Zapmail customers who have been renting them.

The Japan connection

A drop in facsimile prices combined with new and improved functionality and features are also boosting fax use. One factor is the dominance of Japanese vendors in the facsimile market, according to Gartner Group's Erskine. In Japan, faxes have played a much more important role in communications because facsimiles are an effective way of transmitting Japanese idiographic Kanji characters. Therefore, Japanese vendors have pushed the development of features that enhance ease of use and have also steadily driven down prices, Erskine says.

As a result, business managers can choose from a variety of easy-to-use facsimiles for a reasonable cost. In tangible terms, this means a user can get a CCITT Group III fax that transmits at a rate of 15 seconds to 1 minute per page for between $2,500 and $3,500. This fax is also likely to include several popular features such as automatic dialing, broadcasting and store and forward.

Broadcasting permits the facsimile to transmit to several places at once rather than separately. The store-and-forward feature allows users to scan information into a fax, enter a phone number for a receiving fax and command the facsimile to transmit the information at a later time. For another $1,500 or so, business users can find some facsimiles that will print out their transmissions on plain bond paper. The majority of faxes, however, still use the less expensive thermal transfer method.

Most of the facsimiles in use conform to CCITT Group III standards, and this trend is likely to continue for the next few years. Group I, II and III facsimiles all work over standard public phone lines, but earlier Group I and II faxes are analog and take anywhere from 2 to 6 minutes to transmit one page. Group III and IV units are digital. All Group III machines can transmit a page in less than a minute, and many can do so in less than 16 seconds. Also, the resolution of Group III faxes is 200 dot/in. compared with 96 dot/in. for Group I and II units.

Group IV facsimiles are faster than Group III units, and they have higher resolution standards. Transmission rates for Group IV faxes are no greater than 10 seconds per page, and some have a 5-second rate. Moreover, Group IV's resolution is 400 dot/in., greater than the 300 dot/in. resolution of laser printers such as Apple Computer, Inc.'s Laserwriter.

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> *A drop in facsimile prices combined with new and improved functionality and features are boosting fax use.*

Despite these advantages over Group III machines, Group IV faxes will not be used widely for some years. Most of the major facsimile vendors have Group IV units, International Research Development's Townsend reports, but the $10,000 to $15,000 price tag is prohibitive. People are reluctant to replace their current facsimiles, which cost several thousand dollars less, she says.

Perhaps more importantly, many firms do not have the communications capabilities to support the Group IV faxes. Group IV faxes require 56K-bit cables running on wideband networks, Townsend explains. Two common carriers of Group IV are expected to be T1 networks and Integrated Services Digital Networks (ISDN). However, it will be at least two to three years before the availability of ISDN and T1 networks is great enough to make Group IV machines viable.

No Group IV faxes on ISDN until 1990

Dataquest's Weiss is less optimistic. "Group IV facsimiles on ISDN will not be a reality until the mid- to late-1990s," she asserts. Until then, there will be limited use for Group IV because most companies do not run private digital lines, Weiss says. "The cost of converting the central office switch to ISDN is phenomenal." Consequently, the Group III fax still offers the best performance for the dollar, analysts agree.

Group III facsimiles are available in a proliferation of both stand-alone systems with a variety of features and combination products that add copier or telephone functions. Such combination products are aimed at users who want fewer devices on their desks and a chance to keep more funds in the corporate or departmental budget.

The fax-copier duo is a natural and effective strategy, according to Townsend. First, she explains, "because there are so many products being manufactured for the desktop, there is an inherent advantage to any device that serves more than one function." Second, the unit cost of a combination product is greater than that for an individual copier or facsimile, but it is less than the sum of the two units' costs. Therefore, Townsend says, these combination units are easier to sell.

The advantages of a fax and phone unit are similar. Users are attracted by its light, compact size and the cost savings of a two-in-one product, Dataquest's Weiss reports. These fax phones are aimed at upper level executives or home-based businesses, she says. Both Canon's Faxphone 10 and Mitsubishi Corp.'s Model 3160 are faxes with built-in phones.

One potential problem for these units is that the phone and fax share the same phone line. Most vendors have handled the situation by providing the fax with a buffer that holds received tranmissions and signals to the user that a message is waiting.

The most exciting development in combination facsimile products, however, is personal computer fax boards, according to Gartner Group's Erskine. It is perhaps the most active area of facsimile innovation, garnering interest and products from both fax vendors and PC software developers.

Facsimile companies, such as Panasonic Industrial Co. in Secaucus, N.J., and Murata Business Systems in Dallas, introduced PC fax products last year. Several software and peripherals vendors, such as Datacopy Corp. in Mountain View, Calif., Gammalink, Inc. in Palo Alto, Calif., and Advanced Vision Research in San Jose, announced PC fax packages as well. However, only Panasonic and Gammalink have made their products generally available since 1986. The others are scheduled to ship sometime in the first quarter of 1987.

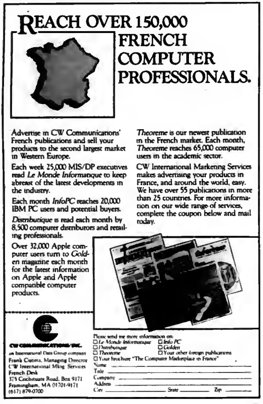
The basic PC fax package consists of a modem board and software that converts computer files to facsimile format. The modem board, which conforms to CCITT Group III standards, fits into IBM PCs and compatibles. Using a fax conversion product with a PC, a user can send files to any fax without printing the material out first. Because of the graphics nature of faxes, these files can include not only text but graphics.

For some users, fax modems are an enhancement to the PC that allows them to cut some steps between creating documents and sending them via a fax machine, according to Weiss. PC faxes also allow corporations to leverage their PCs by adding fax functions without fax costs, Erskine adds. Most PC fax conversion products range from $1,000 to $1,500, about $1,500 less than standard Group III fax machines.

PC faxes are also viewed as remote scanners in businesses that perform computer-aided publishing or design, says Rolando Esteverena, president of Datacopy. Using a PC fax, he explains, "users can scan a drawing into a PC and send it to a remote fax." Additionally, the PC fax has applications in firms that rely on image data bases. For example, an on-line parts catalog that provides descriptions and illustrations can be updated through the PC fax and sent to branch offices.

The potential installed base of PC fax users is huge. There are 20 million to 30 million IBM PCs and compatibles in use today, Weiss says. However, PC faxes will not usurp their stand-alone facsimile siblings. "There's still a large percentage of documents sent via facsimile that are not generated by the PC." As a result, Weiss maintains, PC faxes will only enhance the market. F

Hurst is a Computerworld Focus *senior writer.*



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SECURITY PLANNING

Take A Byte Out Of Crime

Because data is a strategic resource, MIS must learn how to safeguard this precious commodity.

• BY • REBECCA • HURST •

True-life stories of 14-year-old hackers with access codes to the computers of major corporations and financial organizations losing millions of dollars in mysterious fund transfers have circulated for years. In response, executives are beginning to heed the warnings and implement data security systems.

Putting together a data security system is a good first step, but it is only one part of a larger solution. To provide complete data security, data processing managers and MIS professionals need to understand the nature of computer crimes and the type of people who commit them.

MIS also needs to educate both upper management and end users about the importance of security and the company's ethics. By doing so, managers can develop a security system that extends beyond data processing to encompass the entire organization.

Unauthorized computer access occurs primarily among two groups of users: computer hackers and company employees. Most managers are familiar with the stereotypical hacker who breaks into various corporate and government computer systems, often for pleasure rather than profit.

For these hackers, technical security measures such as passwords and encryption are a challenge, says Bill Kirwin, program director for personal computer policies and strategies at the Gartner Group, Inc. in Stamford, Conn.

"Hackers exist to overcome the challenge of the latest and the greatest," Kirwin explains. "Some people make a hobby of getting around copy-protection systems. When a new software product comes out, they run out and get it. They do it for self-glory."

A number of products are available that protect the computer data from the hacker, says Sanford Sherizen, president of Data Security Systems, Inc. in Natick, Mass. However, he notes, the growing crime problem is authorized users performing unauthorized acts. "We're not afraid of hackers; we're more concerned with someone in the company getting in where they have no business," concurs Harvey Shrednick, vice-president of information services at Corning Glass Works in Corning, N.Y.

GREG WENZEL ILLUSTRATION BY PERMISSION OF THE AD COUNCIL

Such unauthorized users may be individuals who accidentally get into the system and decide to explore, according to Wayne Cerow of Cerow Investigation and Consultants in Phoenix. More often, computer crimes are committed by disgruntled employees. Users who feel they should be getting a larger salary may program the accounting system to send all percentages of pennies to a personal account, Kirwin says. Other employees may put a time bomb into an application so that it self-destructs if their employment is terminated, Cerow explains. "An employee can also encrypt a software package and essentially hold it for ransom."

In addition, the trend for internal crime is moving from the individual to employees in collusion. "The bad news is that a couple of authorized users working together can cover each other, so it's more difficult to detect," Sherizen says.

The good news, according to Sherizen, is that separating the duties of employees seems to work in preventing these crimes.

Unauthorized users are typically trying to access the corporate mainframe, but the weak link in security comes with microcomputer-to-mainframe connections and dial-up capabilities. "Integrity of the mainframe data base is not a problem; there's adequate protection," Kirwin says.

Also, there are several mature mainframe security products available including Remote Access Control Facility from IBM, Top Secret from Computer Associates International, Inc. in New York and ACF2 from the Cambridge Systems Group in Santa Clara, Calif.

On the priority hit list of security issues, No. 1 is the ability of a personal computer to capture data that is resident on a mainframe, Kirwin says.

"Once data is captured, it's out of the computer room and susceptible to intrusion by people who want to access sensitive information." This information can be carried out on a floppy, he says. "It can also be changed on the PC and incorporated into a report that misrepresents the data."

SECURITY PLANNING

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> *'Computers control assets that used to be stored in a vault. Now the computer has to be treated as a vault.'*
>
> **— Wayne Cerow**
> **Cerow Investigation and Consultants**

Kirwin claims there are three levels of cooperative processing with micro-to-mainframe links: straight terminal emulation, the ability to upload or download data from the mainframe and the ability of a mainframe application to talk to and cooperate with a PC application. As the level of interaction increases, so does the potential damage to mainframe data.

Emulation fairly secure

Terminal emulation is fairly secure because users can only look at the data. PCs that can download data extracts are a greater security risk because data can be manipulated and taken out of the office, Kirwin says.

However, this level of access does not corrupt the mainframe data base because the user is only accessing a file created from the data base.

The greatest security threat comes from a distributed network data base management system in which a product such as Oracle Corp.'s SQL Star or IBM's R Star allows the PC to pull data from the mainframe data base, Kirwin asserts.

A related PC security problem also comes up when users log on using a macro program, Kirwin states.

"Personal computers have macros that do sophisticated things like awaken the PC, log on to the mainframe, give a password, download a data extract onto the PC and log off." Typically these macros are not protected by encryption.

A simple remedy is to prevent or dissuade users from using macros, but implementing this solution is far from simple. "It's a high benefit to users to create files without having to log on," Kirwin says. "Higher security gives users more incentive to go around it by using a little macro program."

Micro-to-mainframe communications packages contribute to the problem. Typically, these communications packages have an ease-of-use option using macros, but there is no way to disable it, Kirwin says. "Smart software manufacturers would allow this to be disabled," he asserts, "but offhand, I don't know of any companies doing that."

Other options include putting the macro programs in a hidden file or encrypting them so that an unauthorized user could not see them, Kirwin suggests.

The other potential problem with mainframe links is dial-up capability, or remote logon. Dial-up access offers a greater potential for effective intrusion because an unauthorized user can pull data off and run programs locally. "Whenever you have dial-up capability, you have primary vulnerability," Cerow agrees. With dial-up access, a company cannot tell from where someone is calling. "It could be a 747 flying over London," Cerow says. "It's very difficult to track."

One protection from dial-up intruders is a call-back device and password system, Cerow says. In this system, each password is connected with a specific location. When a user calls in to the mainframe, he gives a password. The call-back device then dials the phone number associated with the password. If the user is not at the location at which he is supposed to be, he cannot log on. However, Cerow says, "many people have gotten around this by using call forwarding."

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SECURITY PLANNING

data security are passwords and encryption.

Passwords or user identifications are used to control the level of access a user has. The problem with passwords is that they are easily stolen or guessed, Sherizen explains.

Change passwords regularly

Also, passwords lose their effectiveness if they are not changed regularly. "A lot of companies do not change their passwords when an individual leaves the company," Cerow says. "This person could still go into the system."

At Corning Glassworks, passwords are the primary security device and are changed regularly, Shrednick reports. "Low-security passwords are changed every 90 days," he says. "For more confidential files, we change the password every 30 days."

When employees' positions are terminated, Corning removes their access to corporate files. "In the system, we have a termination list that is checked against our security list," he says.

No encryption at Corning

Corning uses two levels of passwords; users have one to log on and a second to get into specific files. This system fulfills the company's data security needs, Shrednick states. "We don't use anything way out like encryption. Our files are not that sensitive."

The reluctance to use encryption at Corning is reflected by many corporate managers. "Encryption has increased in use, but it is not popular," Sherizen reports. "People say it's cumbersome and expensive. They feel it's not as appropriate outside the government and financial institutions."

Yet, encryption has become more affordable, Cerow argues, and as a result, he expects to see encryption in more communications products and computers.

An area in which Cerow recommends encryption code is computers that use leased lines. Many managers don't realize that a leased line will travel through the same telephone switching, fiber optics and microwave satellite path that normal phone communications do. The communication on these lines can be intercepted and monitored, and the data can potentially be decoded.

However, technical solutions such as passwords and encryption only solve part of the security problem, analysts agree. "Technical security controls will only keep honest people honest," Kirwin asserts. "An effective security system requires education, effective policies and a corporate culture that recognizes the importance of data security. The more you have of that, the less technical controls you need."

The barrier to making security management decisions for many corporations is that they do not even realize the risk to their security. Managers have not done a risk analysis that quantifies the potential exposure to security violations, Kirwin explains. "Those that have have put the brakes on micro-to-mainframe development because it takes time to put in security measures."

One cause for this lack of awareness is that many upper level managers do not realize that the traditional controls have been undercut by computerization. "Computers control the company assets that used to be stored in a vault," Cerow says. "Now the computer has to be treated as a vault."

Conditions ripe for crime

In addition to locating security risks within the computer system, managers should also identify the conditions under which computer crimes are committed. Two conditions that affect computer crime are corporate culture and timing.

Certain environments are more conducive to computer crime, Sherizen states. For example, users who sense that managers are afraid of computers or don't know how to use them are more likely to abuse computer access, he says. The same is true in companies in which users do not perceive computer security controls.

Managers should also be aware that many people know exactly when to commit crimes. For more traditional burglaries, the best time to strike is when a police department is changing shifts, says Sherizen, a criminologist by training.

Similarly, computer criminals look for times when production pressures are heavy, Sherizen

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says. At that time, computer systems are more heavily loaded and employees are off guard. "Fridays are often heavy days, as is the day before a three-day holiday," he notes. "Much of December is also a good time to strike."

More security at peak times

Given these considerations, DP managers can help protect their computer systems by stepping up security during peak performance periods.

In setting up a security system, DP managers need to decide the levels of access available to groups of users within the corporation. These decisions include whether a user should have access to certain files at all and whether that access will include the ability to inquire, download or upload information from the mainframe or departmental computer. Perhaps the most debated issue, though, is the ease of access.

"What people want is universal access and universal protection," Sherizen claims, "but there has to be a trade-off." As more personal computers are connected to mainframes, protecting data is becoming more difficult. At the same time, people are complaining about how onerous logging on to a mainframe is, he notes.

The solution, Sherizen says, is not to make access too easy. "Every time you make a computer system more user-friendly, you potentially make the system abuser-friendly." Also, users should be actively involved in logging on so they play a role in detecting unauthorized access, he asserts. "If you log on and see that someone was on your system yesterday when you weren't there, you should know about it."

Other managers and consultants emphasize the need for ease of use. "We're weighing ease of use with the security of the system," Corning's Shrednick says. "We don't want to inhibit users by setting up too many procedures, rules and regulations. Balance is the key."

Counterproductive measures

Making security too difficult to use can be counterproductive, Gartner Group's Kirwin agrees. "It's like a burglar system that never gets turned on because it's too easy to set off by accident." The more difficult a security system is, the more users will try to go around it, he argues.

Finally, users must be educated not only in the use of security systems but also in their importance to the corporation. Before a security system is implemented, DP managers may find that they have to educate upper management.

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> *'[As] you make a system more user-friendly, you potentially make [it] abuser-friendly.'*
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> **— Sanford Sherizen**
> **Data Security Systems, Inc.**

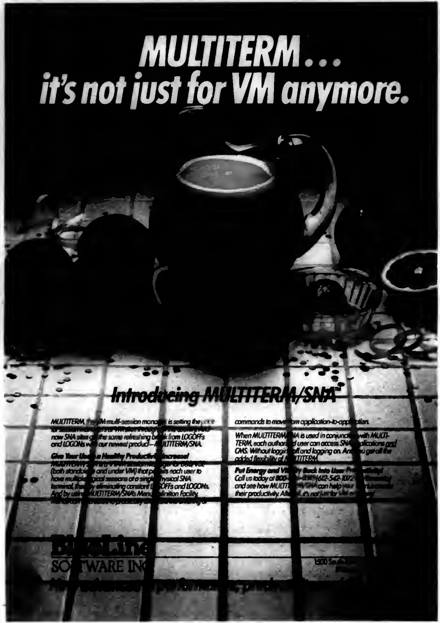
Security is cost-effective, Cerow says, but managers ask, "Where's the return on investment?" Security is more like an insurance policy, he explains. "A lot of managers have to do some hard thinking about that."

Managers have to educate users in general about corporate policies, Sherizen states. "People don't have a sense of whether they're doing something unethical or illegal."

Part of the confusion stems from a tradition of corporate perks. Former office protocol accepted that employees will take pens, pencils and paper as perks, he explains. In the new office protocol, people believe it is all right to take home a disk or use a computer for personal purposes. "They're not faced with a guide for what's appropriate," Sherizen claims.

The goal is for users to take responsibility for data security. "When they go to lunch, they should turn off their terminal or PC, and they should keep their floppies locked up," Kirwin explains. More importantly, he says, "They should want to do it." F

Hurst is a Computerworld Focus *senior writer.*



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SPECIAL SECTION: LOCAL-AREA NETWORKS

Net Management: Streamline Your Data Flow

DAVE RIDLEY

·BY·JAMES·HERMAN·

Communications technology is advancing at an astounding pace, and barriers to information flow are continuing to crumble. Fueled by a new generation of powerful microprocessors, the number of devices linked by information networks is expected to escalate as never before. But MIS must carefully manage the rapid growth of this new data infrastructure to the benefit of its organization.

There have been revisions to the definition of network management. Five years ago, the concept was not even known as such but referred to as network control. Patch and test facilities aimed at diagnosing circuit and modem problems were the mainstay. Operators concentrated on getting the problem pinpointed well enough to know whether to call the phone company. Analysts concentrated on optimizing the network to achieve 90% utilization. Changes occurred at monthly intervals or longer, and, in general, network control was not seen as a major investment.

Today, network management is a different discipline. Network operations specialists are supported by sophisticated systems that automatically detect and sometimes even diagnose failures on a variety of equipment. Analysts expect real-time displays of network performance data. Configuration management specialists provide rapid, continual response to changing network applications, users, devices, tariffs and services. Corporate management expects integrated reporting on network effectiveness and usage.

Network management systems are evolving to achieve this new level of effectiveness. The leading-edge information technologies that are at present transforming industries from manufacturing to financial services will be turned to the problems of network management.

As large organizations expand their repertoire of communications technologies, they also expand the number of network management systems they employ. But this proliferation of network management brings with it various problems. Complicated network situations may necessitate correlating data from many systems, which can be difficult. Operators must learn multiple command sets and user interface conventions. Sometimes it is hard simply finding a room to locate each piece of equipment. Achieving an accurate picture of the end-to-end situation is critical.

Leading vendors are addressing the area of network management. IBM has made an important step in integrating some of its own network management products through Netview, a product that provides a single network software tool for accessing a variety of capabilities.

Managing a multiple vendor environment is difficult and not likely to be resolved for a number of years. Resorting to a single vendor for communications equipment is not a solution either, because no vendor, not even IBM, is able to provide all the capabilities that a large, multiple business organization needs. For the most part, vendors have chosen closed, proprietary means for managing their network components to induce customers to purchase only their equipment.

However, there are some efforts in the industry, like that by Avant-Garde Computing, Inc., to provide integrated consoles that permit operators to use a standard command language. These products act as front ends to management systems, translating commands into the syntax required by the target system. This approach offers only limited relief from the problems of proliferating consoles and diagnostic tools because it can only handle a limited set of functions.

The development of standard interfaces, protocols and data element definitions for basic network management functions may be the answer. Progress is seen in two areas: IBM's Systems Network Architecture and the International Standards Organization's (ISO) Open Systems Interconnect (OSI).

IBM has recently published the specifications employed in its network management systems. By publishing its specifications, IBM

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is making available to other firms the raw material from which to build compatible products for IBM environments.

In the long run, integration of management functions and systems for multivendor environments can only be accomplished through the development of vendor-independent international standards such as those promulgated by the ISO.

Although the standards bodies have been late in realizing the need for standardization in the area of network management, this problem has now come to their attention largely through the Manufacturing Automation Protocol. The ISO has started to expand its OSI model to include what is called the OSI Management Framework. Once this framework is complete, specific definition of protocols and data dictionaries can begin.

The Management Framework defines level managers at each protocol level parallel to the peer entities that implement the OSI protocols. Level managers provide management functionality such as statistics collection, performance monitoring, access control and activation.

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> *The ideal network management system will give a company the ability to make the right choices and get the best deals using extensive data bases and decision support systems.*

Data generated and used by the management function is stored in a conceptual entity called the Management Information Base, which can be colocated with the device being managed or can be remotely accessed at a specialized management system. A special application process, the System Management Application Process (SMAP), communicates among devices and specialized management systems to exchange data and control operation. SMAPs communicate with each other using standard OSI protocols.

The existence of international standards will provide a common means of exchanging management information between systems. Standards will also allow for the development of integrated monitoring systems that combine information from a variety of subordinate, vendor-specific management systems. Eventually, the standards will be incorporated into network switches and servers, completely unbundling the management systems from the devices they manage.

Most large organizations have taken some steps toward integrating the management of their voice/data systems.

Leading-edge users are deploying transmission backbones based on T1 circuits that serve both voice and data needs. Planning is now under way for a migration to integrated switching of voice and data circuits. As voice and data become integrated, it will simplify the network environment.

Integrated communications networks will require integrated operations and management. Yet, voice and data systems have traditionally been managed in very different ways.

Voice systems, primarily private branch exchanges, are usually managed on a decentralized basis using local consoles. Data systems like modems and packet networks are usually managed on a centralized basis, utilizing remote management systems that use specialized protocols to communicate with the devices they manage. Most likely, the integrated handling of voice and data will lead to more centralized control and configuration of voice equipment.

Dynamic resource allocation

As organizations build integrated communications backbones to service voice and data needs, they open up new possibilities for dynamically controlling the use of the bandwidth resource. These backbones are usually built using private switching systems made by companies such as Network Equipment Technologies Co.

AT&T offerings such as Customer Controlled Reconfiguration, Software Defined Network (SDN), Accunet Switched-56 and their counterparts from the other common carriers are examples of dynamic services that allow similar control using the public networks.

Network management systems must evolve to meet the challenge of managing the bandwidth inventory of an organization. They must provide tools for analyzing the capacity needs of an organization in real time and suggesting changes in allocation or quantity of resources. Systems capable of responding to special situations such as videoteleconferencing or a nightly bulk data transfer for backup purposes will also be necessary.

Dynamic transmission services are part of a larger trend toward measured services in which the user pays on the basis of usage. Network management systems can be important elements of managing future communications systems that rely on such measured services.

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Net management systems will be needed to optimize the mix of transmission services in real time, choosing those that offer the best price for the need at hand. The deregulation of the Bell system should continue to increase cost competition. The ideal management systems will give an organization the ability to make the right choices and get the best deals, using extensive data bases and decision support systems.

Another trend in carrier services that will affect network management systems is the likely increase in feedback from the public networks concerning the status of network transmission. Manipulation of dynamic services as described above is an example of this trend, but more general advances will come under the banner of the Integrated Services Digital Network (ISDN) revolution. One of the major features of ISDN is the use of the D channel for protocol-based signaling with the telephone company, which will have profound implications for management of private networks.

Although some observers predict that ISDN will mean the end of private networking, it is doubtful that such a complete change in corporate attitudes concerning the need for private networks will take place within the next 10 years.

The best of the public/private worlds

Instead, telephone company services such as SDN and ISDN will provide elements out of which to build private networks. They offer the possibility of a flexible, hybrid public/private networking approach that will allow the sophisticated organization to obtain the best of both worlds.

Hybrid networks require significant attention to network management and require close coordination between private network management and the management facilities of the public carriers. The carriers will be continually improving the range of management services that they provide and will even be offering to manage private network components from their public operations centers. For example, Pacific Bell has announced a turnkey network management service called Spectrum that may be copied by other divested Bell operating companies.

There are many interesting possibilities that these services suggest. It may be possible to use Bell operating company capabilities as backup to a privately run network operations center, either for redundancy for network operations center equipment outages or to cover for off-hour shifts and weekends rather than providing 24-hour, in-house staffing.

A specific area to consider in examining future services from the carriers is the possibility of exchanging network status information between the private and the public network. Automatic notification of the carrier when circuit failures are detected is one important possible feature. Improved carrier diagnostics on connection status is another.

Automated network management

Automated notification of circuit providers when failures occur is only one small step toward the real goal of automated network management. Given the increased complexity of today's communication systems and the labor-intensive nature of network operations, it is necessary to find ways to use fewer people to accomplish the same tasks.

Through increased automation, operators will be trained more quickly and network management systems can be designed to help them make fewer mistakes. Automation can also have the benefit of shortening the time needed to respond to a problem by eliminating the need for an operator to recognize the condition and activate the proper response.

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> *Some predict that ISDN will mean the end of private networking. But it is doubtful that corporate attitudes concerning private networks will change within the next 10 years.*

The most effective technique for automating network management is embedding it in the network itself. In this way, network devices are programmed to adapt to conditions without intervention. When sufficient equipment and circuit redundancy exists, devices can automatically invoke backup systems when failures are detected.

An example of such a mechanism is an automatic adaptive routing algorithm in advanced packet networks. This routing mechanism allows a network to respond automatically to circuit failures and changes in traffic loading. It does this without intervention and without the use of pregenerated tables of alternate paths. Some vendors' packet switches as well as T1 switches offer similar capabilities. IBM's Low Entry Network also has a self-configuring, adaptive routing capability.

Embedded network management, while feasible for certain functions, cannot entirely replace the function of the

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centralized network operations center. The most promising technology for automating network operations center functions is the use of expert systems and other artificial intelligence methods.

A number of companies including IBM, DEC, Avant-Garde and BBN Communications Corp. have begun to apply expert system technology to the network management problem. Such systems prompt operators to run specific tests or to take certain actions such as contacting a circuit provider. Eventually, these systems may be capable of actually performing complicated diagnostic sequences without human intervention.

Current research is pursuing the idea that the end user is best suited to resolve most communications problems or at least to activate an appropriate bypass mechanism while the problem is being fixed. In the future, automated network management systems will provide users who are having difficulty with the likely causes of system failure and give them assistance in getting the problem resolved or in finding an alternate means of establishing a connection. If this approach is eventually successful, it could lead to a dramatic reduction in the need for dedicated operations staff.

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> *A number of vendors have begun to apply expert system technology to the network management problem.*

However, automated network management products are still many years away. In the meantime, improvements in operator productivity can best be gained by improving the user interfaces that invoke network management software.

Color graphics displays, with pointing devices such as a light pen, a mouse, or a touch-sensitive screen are on the market. Such displays give the operator a picture of the network and indicate the status of its components by using color. They allow the user to see the relationships between individual network components and make it easier to deduce cause and effect.

Also, integrated voice/data workstations, stations that have a telephone handset and a full-function data display combined ioto the same unit, should have a natural application to network operations center environments. Network operators spend considerable time on the telephone dispatching repair personnel and responding to user questions while at the same time using their computer support systems to interact with the network. A voice/data workstation would allow for automated dialing of service providers, automatic logging of incoming calls and integration of dispatch activity with the problem tracking system.

Perhaps, eventually, advanced capabilities will be applied to network management problems. These might include natural language query capabilities or even voice recognition systems. Systems that use speech output are already beginning to appear.

Operations center backup is critical

As networks become increasingly crucial to the organization's daily business, reliable backup for the operations center becomes critical. Backup planning must anticipate the disabling of the site at which the network operations center is located due to fire or natural disaster. Most backup approaches rely on redundancy and, therefore, call for the establishment of an alternate center.

Implementation of a backup network operations center capability requires complex software to maintain the network configuration data base on both systems. This requires some form of a distributed data base system, which is still a challenging technical problem.

In systems that implement multiple centers, network components also need some mechanism for redirecting their status reporting to the backup operations center and some way of knowing the addresses of all centers on the system.

The concept of alternate network operations centers can be generalized to include the use of three, four or more operations centers per network. The addition of extra network operations centers can provide additional redundancy or can provide for specialization of individual centers. Specialization can occur on functional or geographic lines.

In the long run, we may see a network of management systems established above the communications network itself, with each management system in constant communication with others to receive and distribute status and configuration information.

Cooperatively, management systems will provide comprehensive, automated and standardized facilities for measurement, tuning, fault isolation, access control and cost optimization. Such a system could be a strategic weapon for an organization. ■

Herman is director of the Telecommunications Consulting Group at BBN Communications Corp. He has more than 12 years of experience in communications systems design and has managed the Arpanet and Department of Defense's Defense Data Network.

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SPECIAL SECTION: LOCAL-AREA NETWORKS

Users Appraise Value Of LANs

DAVE RIDLEY

• BY • STAN • KOLODZIEJ •

The local-area network (LAN) industry is healthy, although a little paler than expected. Sales and installations of LANs continue to climb, but not as high as some had predicted a few years ago. IBM's Token-Ring Network certainly expanded the market, but it hardly created a revolution or momentous shakeout among vendors. In fact, IBM's open connectivity has made room for more LAN vendors than might otherwise be around today.

And contrary to previous forecasts, LAN installations have not grown to huge proportions. To be sure, there are large LAN installations, but the trend, despite vendors' claims, is definitely toward smaller being better.

Also, LANs have not made the anticipated dent in the micro-to-mainframe market. In fact, many LAN and micro-to-mainframe vendors are sharing components and clients to help expand both markets.

LANs have garnered their share of criticism from industry analysts and users who claim vendors have overpitched their benefits while delivering underwhelming products. LANs have been criticized for creating as many problems as they solve.

Computerworld Focus asked some MIS managers their views on LANs and LAN vendors and what they would include in a LAN wish list.

Bruce Fryer, systems manager at Travenol Laboratories, Inc. in Springfield, Ill., has just finished installing three different LANs based on Nestar System, Inc.'s Arcnet topology. One of the networks, a 42-user LAN, uses PC/Focus-Multiuser, a LAN implementation of PC/Focus, which is a data base management system (DBMS) from New York-based Information Builders, Inc. The networks are used to update inventory and as a help line for product support.

Fryer says he opted for the Arcnet configuration because the topology is easy to set up and he is unrestricted as to the number of file servers that can be used. The Nestar LANs were also selected for their speed and built-in security features.

"We looked at the [IBM] Token-Ring, but it used too much memory. We also have an eye to the future, and when we told IBM that we would someday like to run IBM 3270 Personal Computers on the Token-Ring using APPC [Advanced Program-To-Program Communications], we were led to believe there wouldn't be much memory left."

Though Fryer says he and others at Travenol Laboratories have made the right LAN decisions for their applications, he adds that there is much room for improvement. "What I would like to see in LANs are more network management packages that tell you how much time users are spending on the network," he explains. "We have a diagnostics package in place, but there is nothing built in and nothing that does user logging. I feel more users are going to put pressure on vendors to beef up their network management systems."

Fryer also says that his network needs more performance and speed and that the system bogs down when there is heavy access to the Focus data base.

"I think the new Intel Corp. 80386 computers are going to put more fizz into networks, and there are going to be more servers carrying Motorola, Inc. 68020 processors."

Fryer cautions potential LAN users that they should try to make sure that the network is compatible with the hardware and software they are already running. "Everything has to work together and be tested before the system goes up," he says. "Any compatibility problem is a big problem. If anyone has to rekey something, then something wasn't done correctly. "

He claims, however, that almost 100% of what everybody wants to do with LANs can be done with existing technology. "The problem is that, usually, nobody in-house knows how to implement it," he says. "There has to be more help from the vendors.

"There is also a definite emphasis toward smaller networks," Fryer adds. "Most of the information within a corporation flows within a department, and only about 10% goes outside the departmental area. Vendors are realizing that users are aiming more toward installing smaller departmental networks and tying them together."

As for the future, Fryer advises vendors to provide better LAN security and more standardization within networking software.

U.S. West Materiel Resources, Inc., the procurement arm of Denver-based U.S. West, has also installed PC/Focus-Multiuser on a large, 240-user LAN consisting of Novell, Inc. software and Proteon, Inc. hardware.

According to Steve Dickson, technical support analyst/engineer at U.S. West, the LAN was installed in April of last year and is being used to keep track of procurement contracts and handle word processing and spreadsheet applications. The LAN has a gateway communications facility for 33 of its users to the firm's IBM 3090 mainframe. Most of the micros on the network are IBM PCs and Compaq Computer Corp. micros.

"We installed the LAN because we saw it as the only feasible way to provide computing facilities to our employees within our budgetary limitations," Dickson explains. "Eventually we'll have 400 users connected by the LAN between two buildings."

'Trade-off with IBM'

Dickson admits that they opted for Novell and Proteon as vendors after IBM said it could not deliver Token-Ring Network boards on time. "It's a trade-off with IBM," Dickson explains. "Most [LAN] vendors are supporting and writing software for the IBM, so there is a proven growth path with IBM. The Token-Ring is tolerant to devices being unplugged, the IBM wiring plan specs present an integrated, well-thought-out network that avoids the problems with proprietary, single-wire systems.

"On the other hand," Dickson says, "IBM has to come out with faster network-boards, and they need to provide more bandwidth. But it's not just IBM. We also looked at AT&T's Starlan network but found it way too slow."

Dickson points out several advantages of LANs. "We're in the technical support area, and supporting 240 PCs with six servers on a network is a lot easier than servicing the same number of individual users. There is more coordination and less duplication of effort."

> *'A LAN is merely a facility to provide for building applications, it's not the solution itself. LANs, in themselves, are technologically elegant devices.'*
>
> **— Steve Dickson**
> **U.S. West Materiel Resources, Inc.**

U.S. West cut its software costs in half by buying installed PC software already on the network instead of equivalent stand-alone software. As for the LANs' slowness, Dickson says, they have better response times on the network than they had with stand-alone PCs.

Dickson also lists some general disadvantages of LANs. The relative newness of the LAN technology itself, he says, has made it difficult to provide network technical support to users, and it has also made the company very reliant on vendors. There was also some apprehension on the part of the DP establishment at U.S. West about the feasibility of allowing Dickson and others to convert from stand-alone to networked systems.

"Sometimes it's as much a question of perception as it is of technology. It's like the idea of LANs being oversold by vendors. I think the capabilities are there, but getting them over to the users can be a problem," Dickson says.

"A LAN is merely a facility to provide for building applications, it's not the solution itself. LANs, in themselves, are technologically elegant devices."

In the future, Dickson sees IBM's network gaining in market momentum. "The more people you have who are familiar with the Token-Ring and who can come in and install it quickly and accurately, the more business will be coming their way. What this industry needs is more standardization in technical expertise."

First on Dickson's LAN wish list is the ability for LANs to provide remote internetworking through gateways to X.25, T1 or Integrated Services Digital Network transmission facilities. "I think there will be products out there capable of doing this by the end of 1987," Dickson predicts.

St. Luke's/Roosevelt Hospital Center in New York is planning an ambitious network for 1987 that will consist of broadband cable tying together 150 IBM PCs and numerous IBM 3270 terminals driven by a private branch exchange and using Information Builder's Focus mainframe DBMS on an IBM 3090 for micro-to-mainframe data extraction. Along with PC networking, the broadband cable will provide video transmission, video conferencing and patient monitoring via television.

"Networking speed isn't such a factor for us, because most of our PC users are what I would term casual users," explains Robert Tsue, assistant vice-president for MIS at the hospital.

"It's a big enough installation, however, in that we need good network management software. We have pieces of IBM's Netview management system and will probably get the entire package. We'll have auditors, other financial people and nurses using the network in-house, but we'll also have doctors dialing into the netwprk from outside offices to check on patient health and financial data.

"Security is not that big a concern because most of our security is already built in. Network management, however, is important. We have to know who is coming on the system, from where and when. We'll need batch and real-time monitoring. We've even hired a full-time staff member to handle network management," Tsue says.

Keeping it simple

On Tsue's network wish list is "a real desire to see networks become simpler to use. I haven't seen one standard, complete book yet on what's available out there in networking. I also would like to see the market simplify itself. There are too many small LAN vendors complicating an already complicated market. It might not be bad if some of the smaller players dropped out."

Having installed networks, Doug Forrest claims he has done a lot of research into LANs. The New York City-based LAN consultant, who is currently setting up a small Novell LAN for his father, a New York furrier, says the biggest wish clients want from LANs is more bandwidth and speed.

"Since most LANs are Ethernet and baseband, you run straight into a trade-off," he says. "You can increase bandwidth and speed but at the expense of network modularity and reliability. For most installations, however, you don't need to push the limits of the network."

Forrest says that, with the right technical expertise, there are more opportunities in the LAN market now to put together low-cost, powerful networks.

"I'm putting together a Novell Arcnet LAN inventory control system using a Compaq 386 as a file server for a client," he says. "We back up files from PCs into a Bernoulli box in case the server goes down. You can't run the network from the Bernoulli, but you can at least access the stored data. If a node on the Arcnet goes down, it doesn't affect the other nodes.

"I set the entire LAN up quickly, following instructions from the vendor manual, and there were no problems. My point is, if you do your research and shop carefully, you can put together a small LAN for cut-rate prices without relying on IBM and a few others. In a way, it's becoming a commodity market at the low end."

At General Electric Co.'s Aerospace Control Systems Department (ACSD) in Binghamton, N.Y., the company is building a 600-user Ethernet network from Digital Equipment Corp. using 10 DEC VAX machines as network servers. The division of GE, which makes computers for flight control, will use the network for handling manufacturing and engineering design and production applications.

A need for net management systems

"We're not concerned with security or with speed as much as we are with keeping track of bandwidth use," explains an ACSD staff design engineer who wishes to remain anonymous. "We need some sort of analysis tool that can give us accurate details on bandwidth being employed over time. Neither DEC nor the other vendors we've looked at provide the kind of network management system software we need.

"I think that will change," the design engineer claims. "Network management is going to be one of the biggest user concerns in the future, especially with some of the larger LAN installations."

At another GE facility in Schenectady, N.Y., a systems specialist is installing two separate but integrated Fox Research, Inc. 10-Net LANs with 35 users each. He says that his biggest concern for the future is the specter of software manufacturers turning back the clock to the days of software copy protection.

"Businesses installing LANs have a responsibility to make sure they don't violate copyright laws and agreements with vendors," he explains. "We've already run into some problems with one of our [PC] software suppliers in this regard. Networking provides more of a group opportunity to copy and violate such agreements. I think it will become a bigger issue as more LANs are installed."

In the end, maybe Travenol Labs' Fryer has the right idea about LANs. "I've found there is only one universal truth in LANs," he explains, "And that is, there are no universal truths." ■

Kolodziej is Computerworld Focus *senior editor.*

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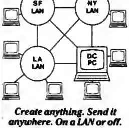

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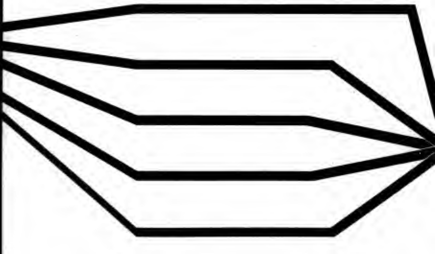

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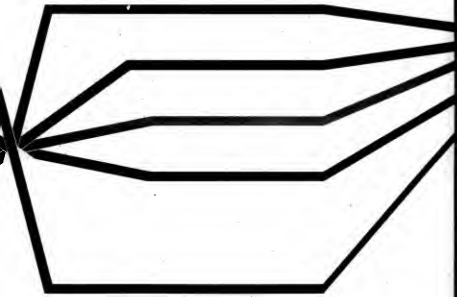

T1 NETWORKING

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SPECIAL SECTION: LOCAL-AREA NETWORKS

Peer Networks Gain Ground

DAVE RIDLEY

BY MICHAEL DURR

Host networks are giving way to peer-to-peer networks. It won't happen overnight, but the direction is clear, and MIS should keep a close eye on this trend. Pressure behind the movement is so great that even big supporters of host networks are beginning to accept the inevitable.

A 1986 report by the Gartner Group, Inc. Local-Area Communications Services comments on IBM's interest in maintaining the demand for high-margin, host-type systems. However, according to the report, "There is little IBM can do to maintain margins. Network technologies are moving too quickly down the price/performance curves to keep users on their hierarchical networks. Big Blue will have to accelerate its support for distributed solutions."

All computer companies will be affected by the move to peer systems, from the mainframe/minicomputer vendors to personal computer local-area network (LAN) companies. As peer networks grow beyond their work group orientation to encompass departmental and buildingwide networks, hardware and software vendors must develop products to support host and peer systems as well as diverse types of computing hardware.

The term "peer network" refers to a system designed to support data communications among intelligent machines. The machines are not necessarily peers, or equals, relative to their processing power or function. In fact, large peer networks can support a variety of PC workstations, file servers and other special-purpose servers. These servers might be micros, supermicros, minicomputers or mainframes.

Because peer networks are composed of intelligent machines, processing can take place in any machine, at any desired level on the network. In other words, peer networks support distributed processing.

Host networks, by contrast, require shared processing. The host computer is the only intelligent device in the system. Dumb terminals are attached to the host and must share the host's processing power. Host networks are described as hierarchical because of the inequality of the components (intelligent and dumb devices) that are communicating.

The cost difference between peer networks and host networks is partially explained by looking at communications costs.

The first step in communications management is to determine how much data movement is actually required. In most data processing environments, while data traffic may be heavy, that traffic is typically within a department. As much as 80% of most departmental data processing could be appropriately handled within the department.

In the distributed processing network, data can be processed where it is used. But, in a shared processing host network, that departmental data must travel the additional distance from the department to the host. That wastes communications services, raising the cost of data processing.

Another cost factor in comparing host networks with peer networks is the expense of host processing. Host systems are more complex, and profit margins on host processors and applications software are substantially higher than they are on PCs and PC applications software.

The MIS department of a large bank estimates that a full-service IBM VM time-sharing system, complete with processing, applications software and consulting support, costs $5,000 annually per user. The bank estimates that for a functionally comparable IBM Personal Computer AT workstation, complete software library and consulting support, the annualized cost is $3,600 per user. In this case, opting for PC-based, distributed processing results in a 28% savings.

While cost may be sufficient reason to migrate from host networks to peer networks, it is not the only reason. Much of the support for peer networking has sprung from the general acceptance of the PC. Peer networks, specifically PC LANs, operate as a natural extension of the PC

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environment, making them the logical choice for networking PCs.

The PC gave us the ability to perform distributed processing but left open the question of how to integrate that processing into an office automation network.

Peer network technology evolved as the answer to that question and as a way to support information sharing among PC workstations in a multiuser environment.

One of the foundations of peer networking is disk access synchronization. After several solutions, the computer industry settled on the Extended Opeh and the Physical Lock features as first defined in Microsoft Corp.'s MS-DOS 3.1. The Extended Open provides a file-locking mechanism and the Physical Lock implements record locking.

Another important technical feature of peer networks is their processing flexibility. Peer networks are often associated strictly with distributed processing. That's a misconception. Although these networks support distributed processing, processing can also be centralized.

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> *Peer networks are often associated strictly with distributed processing. That's a misconception.*

Two activities that are centralized are disk access and network management. The LAN industry has adopted the file server system of management in which workstation requests are processed by a server machine. The server then accesses the disk. The file allocation table and the question of when and where data may be written to disk are all managed by single machines on the LAN.

Eliminates corruption

This guarantees data integrity and prevents the type of data corruption that was a common problem on early LANs when PC workstations were allowed to go directly to the disk.

Sometimes it is desirable for other activities to also be centralized. Application processing, for example, usually involves manipulation of small amounts of data and is handled in the distributed workstations. Workstation processing, however, may not be efficient for data base management and large processing jobs.

Peer networks can support batch processing so that when an end user has a large job to process, that job can be offloaded to a shared processor.

A range of batch processors

This prevents the workstation from being tied up, and it also lets the job be run on a more powerful machine. Supermicros, minis and mainframes can all be used as batch processors.

Some data base operations are more efficiently performed in a central processor.

It is not an issue in smaller data base systems, but as the size of data bases and the number of workstations has increased, so has the need for centralized processing.

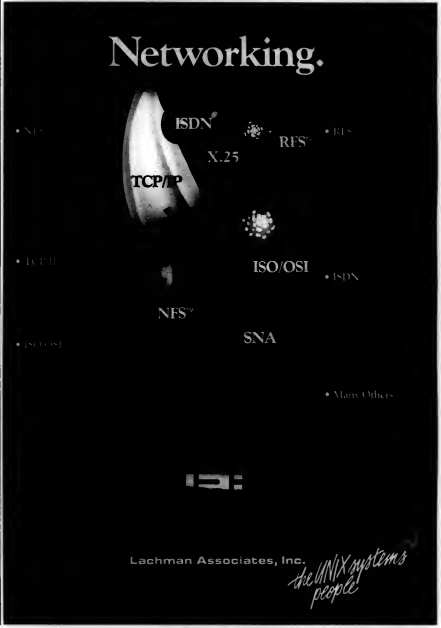
Where centralized processing is needed, peer networks permit the use of data base servers, which perform the processing.

Piecemeal growth

Peer networks have matured in small work groups and departmental LANs. The industry is now in a period of adding the pieces, such as the data base server, that are needed to move peer networks into large departments and corporatewide networks.

IBM and AT&T have introduced peer network cabling schemes for large buildings. The IBM Token-Ring cabling system and AT&T Premises Distribution System provide the first cabling strategies that are suitable for linking hundreds of PC workstations in vertical high-rise buildings.

In the meantime, minicomputer firms like Digital Equipment Corp., Hewlett-Packard Co., Tandem Computers, Inc.



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and IBM are adapting their minicomputers to act as file servers for networked PCs.

Further accelerating the peer networking trend, most of the domestic computer industry has indicated a willingness to support LU6.2, IBM's Systems Network Architecture peer networking subprotocol. LU6.2 allows applications to communicate with each other without going through a host computer.

Because of the heavy development activity to support peer networks, the issue of standards is a critical concern. The many different products suggest a dynamic but confused marketplace.

A solution in sight

Fortunately, the problem is not as insolvable as it may seem. For example, multiple standards are now routinely accommodated in LAN cables and network adapters and many LAN companies provide bridging products, which support heterogeneous internetworks.

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> *Further accelerating the peer networking trend, most of the domestic computer industry has indicated a willingness to support LU6.2.*

When the same network operating system is run on top of the dissimilar hardware, the internetwork looks like one virtual network to the end user.

A solution is also emerging for integrating dissimilar types of computers on the network. Up to now most attempts at integration have used a host network approach. Personal computers are connected to a mainframe or minicomputer and can act as workstations by emulating dumb terminals.

This process gives us access to mainframe- or minicomputer-based data but in a host environment. The application stays at the host, and the processing capability of the PC is wasted.

Having PCs emulate a host system is undesirable. The device on the desktop is the PC, and that is the device users understand. That PC environment should be maintained even in a heterogeneous network.

Ideal integration

The ideal computer integration scheme would allow for centralized or distributed processing and would allow each connected personal computer workstation to maintain its own individual environment. An IBM PC would continue to look like a PC, an Apple Computer, Inc. Macintosh would continue to look like a Macintosh and so forth while they simultaneously share network resources with each other.

This kind of integration is possible through a system known as the universal network architecture (UNA). UNA offers a model for integration in which a variety of dissimilar intelligent workstations can be attached to the same server and generic file system.

In a typical homogeneous network, a set of communications programs (protocol stacks) is loaded at the server and at each workstation.

Multiple protocol stacks

Under UNA, the server would load multiple protocol stacks — one for each type of workstation being supported. A protocol translator running at the server links the individual workstation protocols to the generic file system.

Most computer systems can be interconnected through the UNA. Host systems can be connected to the network server using file transfer utilities.

PCs can manipulate the host data using their own native PC applications, and the generic file system provides a consistent set of services throughout the network.

Products that follow the UNA system are expected to be released beginning in mid-1987.

For many companies, the movement from host to peer networking starts at the desktop with PCs attached to a peer-type LAN. However, this movement has not remained limited in scope.

Because of the cost and productivity advantages peer networks have over traditional host networks, peer networks increasingly are considered for large department and corporate networks. Peer network technology is supporting these larger systems with more powerful network servers, premises-type wiring systems and the ability to perform distributed or centralized application processing.

The problem MIS faces as PCs and peer networks move into corporate computing is how to efficiently tie these diverse systems and machines together. The universal network architecture may be just the solution. ■

Durr is a consultant with Novell, Inc., a local-area network company based in Provo, Utah.

He is the author and coauthor of several books on communications and networking including Networking IBM PCs: A Practical Guide, Second Edition.

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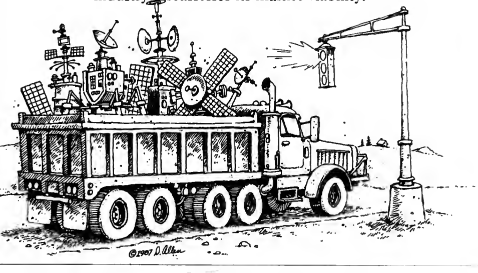
CIRCLE READER SERVICE NUMBER 232

Satellites Confront An Uncertain Future

Putting failed satellite launches and the *Challenger* disaster behind it, the satellite industry reassesses its market viability.



• BY • LYNN • HABER •

Perhaps the greatest irony for the satellite industry is that as a result of recent negative publicity surrounding failed satellite launches and the explosion of the U.S. Space Shuttle *Challenger*, both players and users have a greater understanding of this market.

"Overall, the satellite industry has been in a stalemate for the last couple of years," says C. William Reed, director of research services for Link Resources, Inc., a market research company in New York. "On one hand, there's been a glut of transponder capacity, and on the other, there's been a wait-and-see attitude by end users as to whether terrestrial solutions will provide the same efficiency as satellites."

But now, industry analysts expect that the satellite industry will stabilize in both performance and cost. At the same time, analysts believe that users of communications services will demystify their network needs and explore the variety of communications options available to them.

"There's been a lot of proposal writing over the last few months by companies evaluating what to do with their satellites," Reed says. "There's also been a lot of end users looking into VSAT networks and private terrestrial line usage."

When all this network examination is done, satellite service industry revenue will reach $4.74 billion by 1990, up from $1.57 billion in 1984, according to Link.

Link says the recent difficulties experienced by the satellite industry are not enough to completely stunt the steady growth of the domestic market for satellite services. But, Link acknowledges, the setbacks are dramatic enough to force a substantial change of direction in the markets being targeted for services and in the prices for satellite transmission capacity.

Therefore, unlike the mid-1970s when the domestic satellite market was driven by broadcasters and CATV programmers, the industry will begin to see business communications, in particular data transmission and one-way broadcast videoteleconferencing, providing a large percentage of the growth of satellite service revenues for the coming five years.

Major players in the satellite market include AT&T; Communications Satellite Corp.; GTE Spacenet Corp.; Hughes Aircraft Co.; Satellite Transponder Leasing Corp., a subsidiary of IBM; RCA American Communications; and Western Union Corp.

According to these vendors, many companies are reevaluating the status of their satellite services. For example, RCA has recently left the private-line business and will focus on Ku-band TV delivery, a spokesman reports.

Also, in December 1986, AT&T announced the $2.7 million acquisition of Ford Aerospace Satellite Services Corp., a subsidiary of Ford Aerospace. The venture gives AT&T access to some design work in hybrid Ku/C-band satellite technology. The company also announced a new Ku-band VSAT service called Skynet Star Network Service.

Reed contends that the differences between system operators and satellite service resellers are blurring. Traditionally, system operators launch, own and operate satellites, while satellite service resellers are brokers of satellite transponder time and associated services. A merging of services will occur because of cost factors, the current transponder glut and

SATELLITE OUTLOOK

growing competition — factors that, when combined, are altering the conventional roles of industry participants.

Ever since the first commercial satellite was put into orbit more than 10 years ago, there has been little public understanding about satellite technology. Additionally, service providers have, during the years, redefined the type of communications services that could best be provided by these objects in geostationary orbit 22,300 miles above the earth.

End-user awareness

The level of end-user awareness of satellite technology and services continues to remain low. "On an awareness scale of 1 to 10, [with one being the lowest level of awareness], I'd give the public a 3.5," says Pat Aussen, district manager of satellite communications for AT&T.

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> *'There's been a wait-and-see attitude by end users as to whether terrestrial solutions will provide the same efficiency as satellites.'*
>
> **— C. William Reed**
> **Link Resources, Inc.**

Ray Marks, vice-president of marketing at GTE, describes corporate awareness of satellite technology as terribly low. Why? "The satellite industry did a poor job of providing information and never targeted the end user with the application," Marks says.

But now, the satellite industry reportedly is about to catch up. For starters, the problems that have recently been brought to light regarding satellite technology have been related to launches and not to the ability to provide service. As a matter of fact, Marks explains, no satellite, once in orbit, has ever been lost. Therefore, the risk lies in getting satellites into orbit. This risk factor, while it may not have a direct effect upon a satellite's ability to provide reliable service, nevertheless affects end users as the cost of launches and insurance escalate dramatically.

Even prior to the *Challenger* disaster, the state of the satellite insurance industry was poor, according to Robert J. Tirone, vice-president of the aviation and aerospace division of Alexander & Alexander Services, Inc., a New York brokerage firm.

In February 1984, two $75 million communications satellites launched by *Challenger* failed to achieve orbit, rendering them useless. One satellite, the Westar VI, owned by Western Union, was insured for $105 million, and the other, the Palapa B-2, owned by the government of Indonesia, was insured for $85 million.

While the satellites were retrieved, insurers' relief at the rescue was psychological only — the underwriters still payed $180 million on the loss.

After footing the bill for the retrieval, which cost in excess of $10 million, the insurers only recouped $40 million for the two satellites, which suffered damage and needed to be refurbished.

And while the 1986 *Challenger* disaster alone did not have a severe impact on the insurance industry — there were no insured payloads on that launch — confidence in the space industry was shaken. And if that incident wasn't enough to send ripples through an already skeptical insurance industry, the failure of a French Ariane rocket to launch two satellites shortly thereafter did.

Whereas two to four years ago each satellite on a launch could be insured for $100 million, today, companies are underwriting only $60 million to $80 million in insurance capacity per launch, regardless of the number of satellites, according to Tirone.

'Insurance is inadequate'

"This type of insurance is inadequate in most cases because it wouldn't cover the capital investment on one satellite, much less two," Tirone explains.

But a government policy enacted since the *Challenger* disaster that states that the National Aeronautics and Space Administration will not launch any commercial satellites has created optimism among both the satellite and insurance industries that stability may be reclaimed both in the sky and on the ground.

Private manufacturers of launch vehicles — such as McDonnell Douglas Corp., General Dynamics Corp. and the Martin Marietta Denver Aerospace Division — are announcing plans to pick up the commercial satellite market where NASA left off.

For example, Martin Marietta has signed a memorandum of understanding with its first satellite customer, Memphis-based Federal Express Co. The first commercial launch is targeted for as early as 1989, with a second option in 1990, a spokeswoman says.

A McDonnell Douglas spokesman reports that his company is in the discussion stages regarding commercial launches. A final decision by McDonnell Douglas rides on a contract award decision by the U.S. Air Force for a medium-class rocket called the MLV. A stipulation of that contract, according to the spokesman, is that the rocket provider will have to offer commercial launches. All three launch vehicle vendors, McDonnell Douglas, Martin Marietta and General Dynamics, have bid on the MLV contract.

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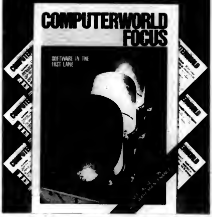
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SATELLITE OUTLOOK

It is expected that satellite companies that scheduled launches prior to the space shuttle disaster will find alternative means of launching, such as using the budding independent satellite vehicle industry in the U.S. or foreign launch vehicles such as the Ariane.

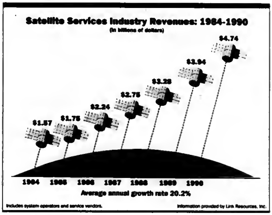
And, according to reports from company spokesmen, users have found alternatives. Satellite Transponder Leasing Corp., for example, has plans to launch its SBS 5 satellite in the second half of 1987 on an Ariane vehicle. GTE also has two launches scheduled for 1987 aboard an Ariane, and RCA has secured 1989 and a 1990 launch dates on Ariane rockets for two of its own units.

Privatization is good news

The potential privatization of launches is good news to the insurance industry, Tirone says. "It is easy to speculate on the success, the safety and reliability of these companies because they have a proven track record." Up to now, these companies have been producing launch vehicles for military applications.

Tirone claims that if an independent launch vehicle industry is established, the satellite insurance industry, within a two-year time period, will regain confidence and expand. "I think we'll see stability somewhere below the rates that were in existence prior to the shuttle disaster — which was about 30% of the insured value — but nowhere near 1983 rates of 5% to 6% of the insured value," he says.

The cost of satellite services to end users depends on how the space industry rates stabilize, the available amount of satellite transponder capacity, demand for service and how competing communications technologies shape up.


Satellite Services Industry Revenues: 1984-1990
(In billions of dollars)

Average annual growth rate 20.2%

Includes system operators and service vendors.

Information provided by Link Resources, Inc.

While the cost for satellite services today has not reflected the upheaval in the space industry, end users can expect to see higher service costs as new satellites are launched to replace old ones.

Another important cost factor is the availability and use of satellite transponders — devices that receive and transmit signals. Older satellites have 12 transponders whereas newer ones have 24.

According to Link, at the beginning of 1986 nearly 600 total transponders were in operation. Link estimates that by 1990 there will be approximately 960 total transponders available.

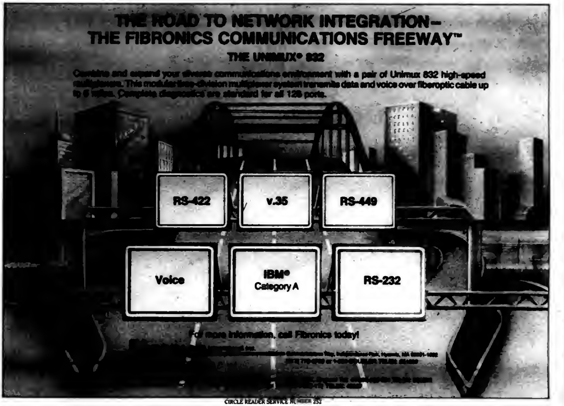
Transponder capacity and cost vary. There are C-band transponders with frequency ranges of 4 GHz to 6 GHz and Ku-band transponders with ranges from 12 GHz to 14 GHz. Originally, C-band was a more popular technology for satellite systems, but recently, Ku-band technology has been gaining favor. One reason behind its growing popularity is that low-cost Ku-band VSAT technology has become available, encouraging user interest. Another contributing factor is that there is a greater risk of interference on the C-band frequency because terrestrial communications services, such as microwave, also operate in C-band.

By year-end 1984, there was an overall transponder glut, largely due to overzealous predictions for transponder need. According to Link, the cost of a Ku-band transponder in 1985 ranged between $130,000 and $150,000 per month. Link analysts do not expect demand to catch up to supply, and they predict that prices will stay about the same and stabilize in 1987 to 1988 in anticipation of huge increases in capacity expected for the 1989 to 1990 period.

This increase in transponder capacity will result from the launching of more Ku-band satellites improving the ability to utilize bandwidth more efficiently and using multiplexing techniques.

C-band transponders are already priced between 10% to 20% below Ku-band ones and are suffering more than Ku-band from overcapacity. They are expected to experience further price declines as more data and video applications are moved to the more efficient Ku-band technology, Link reports.

Another area that will affect satellite service costs to users is competition from other communications vendors, most notably those



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CIRCLE READER SERVICE NUMBER 252

SATELLITE OUTLOOK

offering long-haul, fiber-optic networks.

While satellite network services and fiber-optic networks will compete in certain application areas, service vendors say they believe these two technologies will, in fact, complement each other.

A question of need

If they were not complementary, AT&T, a vendor of both satellite and optical fiber networks, would then appear to be competing with itself. "From our perspective, whether a company opts for fiber or satellite is a question of application need," AT&T's Aussen says.

AT&T's strategy is to be a full-supply vendor, giving customers the option to choose the transmission media that is most appropriate for their applications, Aussen contends.

Industry analysts and participants agree that satellites have an important role to play in a corporation network strategy and that the technology can offer application-specific services more cost-effectively than other communications methods.

Provide voice, data, video

Satellites can provide voice, data (such as facsimile) and video (teleconferencing, broadcast and CATV). Analysts agree that data transmission will experience the most rapid growth through the end of the decade, due, in part, to the demand for high-speed data transmission by businesses. Corporate users are also expected to use videoteleconferencing capabilities.

James H. Brown, vice-president and general manager of Satellite Transponder Leasing, says that every MIS manager should be aware of new applications that satellite technology can bring. "For example, VSAT networks are a way to replace multidrop leased lines," he says. Point-to-multipoint networks (star topology), where a central hub transmits to numerous sites or distant locations, is seen as an ideal application for satellites.

In addition to the increased need for data networks, VSAT networks are attractive because both VSATs and satellite transmission costs have come down dramatically in the last two to three years.

Last-mile access

Also, fiber-optic networks suffer from a problem known as last-mile access. Whereas fiber-optic networks extend between most major cities, these networks often do not extend to less populated or remote areas where businesses may require data transmission services.

Today, VSATs are capable of two-way transmission at up to 56K bits. However, Brown reports, most are used at lower speeds such as 4.8K bits and 9.6K bits.

When should a corporation consider a VSAT network? Industry participants throw out a standard scenario that says when a company's data communications costs reach $350 per month per site in a network with more than 25 locations, it's time to consider a VSAT network.

Another, although limited, satellite application is in voice transmission. David Rubin, senior telecommunications consultant with Arthur D. Little, Inc. in Cambridge, Mass., says that while users learned years ago that satellites are not good transmitters of voice due to time delays and inferior transmission, for certain voice applications satellites can be a cost-effective solution.

"For internal communication or for communication to out-of-the-way places where a user might want to quickly set up a network, satellites can be utilized," he says. "They should not, though, be used for premium applications."

Whichever application a company decides is right for satellite transmission services, it should know that there are time and cost options for satellite service.

These options include full-time usage, occasional usage or what is called hot-slot usage. Hot-slot usage is second-class use in which, for a lower service cost, there is the risk of being bumped off a network if the vendor needs a firm's transponder.

The bottom line is that network managers must understand that satellite technology is just one more transmission alternative they need to know about to make the most effective and efficient use of their own networks. ◼

Haber is a Boston-based, freelance business writer specializing in computers and communications.

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THE COMPANY TO WATCH

CIRCLE READER SERVICE NUMBER 230

COMMUNICATIONS PRODUCTS

Applitek Unwraps Gateways To Unisys Machines

WAKEFIELD, Mass. — Local-area network (LAN) vendor Applitek Corp. has introduced two gateway products, Burroughs N110/G gateway and Sperry N110/G gateway, to connect asynchronous terminals to host computers from Unisys Corp.

Burroughs N110/G gateway allows communication over Applitek's Unilan network between Burroughs host computers and terminals. The product also provides protocol conversion between asynchronous terminals and Burroughs hosts.

Sperry N110/G gateway allows communication between Sperry line hosts and terminals as well as protocol conversion between asynchronous terminals and Sperry hosts over Unilan.

In addition, the N110/G gateways support procedures for poll select, a multidrop protocol used for connecting terminals to host computers, according to the vendor.

Support up to 64 virtual circuits

The N110/G gateways support up to 64 virtual circuits at a maximum line speed of 9.6K bit/sec. and perform both master and slave site evaluations. The gateway is controlled remotely by a network manager using the standard Unilan mode functions. These include enabling and disabling the gateway, displaying and initializing the unit's field history file, renaming the gateway, updating the unit's network parameters and gathering statistics on its operation.

With the Burroughs N110/G, the poll-select link interconnects the gateway to a Burroughs B874, CP3680 or CP2000 front-end processor. The gateway then appears as the processor to any Burroughs ET1100, MT980 or TD830 terminals or any another host connected to the N110/G gateway.

With the Sperry N110/G, a bisynchronous poll select link interconnects the gateway to either a Sperry DCP 10/30/30 network controller or to a Sperry Group Controller Secondary. For remote connection, the Sperry gateway appears as a Sperry host to UTS-20 terminals or another host.

The connection is supported on a synchronous link using Sperry's Uniscope central site line procedures.

In a slave environment, the Sperry gateway also connects to a Sperry host via a synchronous link using Uniscope. The Sperry gateway emulates Sperry's TMux terminal multiplexer to the Sperry host. Ansynchronous terminals then connect across Unilan to the N110/G, which performs UTS-20 or DCT-1000 emulations.

Both gateway products are available. Prices start at $600 per connection.

For further information, contact Applitek Corp., 107 Audubon Road, Wakefield, Mass. 01880.

Circle Reader Service Number 311

Xerox Enhances Faxmaster Product

ROCHESTER, N.Y. — Xerox Corp. introduced Image On Screen, an enhancement to its Faxmaster personal computer ASCII-to-facsimile conversion software that allows users to view incoming facsimile transmissions on a CRT screen. Users can then print out only those pages they want, reducing paper costs.

Previously, Faxmaster users could use their IBM Personal Computers or compatibles to transmit or receive documents, but they could only view documents that had been keyed into the Faxmaster PC. Users could not view a document that had been scanned in from a central facsimile unit or from a remote terminal.

With Image On Screen, users can view transmissions from other faxes on their terminals. Image On Screen also allows an operator to scan a file containing both text and graphics into a PC and add it to another file for viewing, transmission or storage.

Resides on AT or compatible

Faxmaster software resides on an IBM PC AT or compatible that is directly connected to a Xerox Telecopier 495-1 facsimile terminal. The 495-1 functions as the central unit on a fax network.

Faxmaster with Image On Screen is available for $695 per copy. The Image On Screen feature will be delivered free to current Faxmaster users.

For further information, contact Xerox Corp., Xerox Square 006, Rochester, N.Y. 14644.

Circle Reader Service Number 313

Corvus Unveils Omninet LAN Operating System

SAN JOSE, Calif. — Corvus Systems, Inc. has introduced PC/NOS, a network operating system for its Omninet local-area network.

Corvus claimed PC/NOS can reduce the cost per network system user by a factor of five over competitive network systems. The company said PC/NOS achieves its dramatic cost reductions from the use of advanced design techniques that permit networks to be created without file servers.

PC/NOS software features file server support of IBM PC-DOS 3.1 file and record-locking calls as well as access security control for nodes, peripherals, disk directories and files.

Will support multiple servers

The company added that when file servers are required for performance reasons, PC/NOS will support multiple servers, avoiding the user's loss of upper end performance.

Corvus claimed that in a 10-user system comparison of PC/NOS with 3Com Corp.'s Etherseries and Novell, Inc.'s G-Net, the cost per user of these systems was more than four times that of the equivalent Corvus system. In a five-user system, according to Corvus, the cost per user of competitive systems is more than five times that of a Corvus system.

PC/NOS is priced at $695 for 64 users.

For further information, contact Corvus Systems, Inc., 2100 Corvus Drive, San Jose, Calif. 95124.

Circle Reader Service Number 312

Netlink Datacom Interface Out

RALEIGH, N.C. — Netlink, Inc. introduced SNA Gate, an advanced data communications interface that allows corporate networks using IBM's Systems Network Architecture (SNA) to accommodate a range of non-SNA devices.

SNA Gate is said to be a multifunction protocol controller that concentrates as many as 16 lines using mixed protocols at speeds up to 64K bit/sec. These protocols can include various bisynchronous devices such as IBM's 3270 and 3780, asynchronous terminals and personal computers.

The gateway product provides full IBM SNA terminal emulation via dial-up or leased-line connections to remote asynchronous devices such as personal computers, printers, plotters, portable data communications terminals and graphics devices.

SNA Gate handles multiplexing and protocol conversions while preserving SNA's end-to-end integrity and path control, Netlink said. This ability frees the host and front-end systems for other computing tasks and eliminates the need for a separate host access method to support non-SNA devices, according to the vendor.

SNA Gate is available in two versions. Model 3703-1 supports asynchronous and bisynchronous devices and is priced from $7,500 for two ports to $13,800 for 16 ports. Model 3703-1A supports only asynchronous devices and is priced from $4,500 for 10 ports to $7,200 for 16 ports.

Both models are available now and include a three-year warranty.

For further information, contact Netlink, Inc., 3214 Spring Forest Road, Raleigh, N.C. 27604.

Circle Reader Service Number 314

HP Offers Tools To Integrate PCs Into OA Systems

PALO ALTO, Calif. — Hewlett-Packard Co. announced two software products, HP Resource Sharing and HP Information Access, that allow users to integrate personal computers into office systems.

HP Resource Sharing allows PC users to share access to files, disk space, printers, applications and tape drives. The software package stores key documents and other data in a Microsoft Corp. MS-DOS format on a common HP 3000 disk drive, allowing users with the proper clearance to access the data. Only one copy is stored to prevent inaccurate, outdated or redundant files, but the HP 3000 computer permits several users to access central files concurrently.

HP Information Access is an enhanced version of HP Access that reportedly provides a 40% performance improvement. Information Access enables PC users to choose and format local and remote HP Image data using simple menu commands. These users do not need to know the data base location or structure. Once the data is retrieved, it can be organized, formatted and transparently downloaded into PC applications such as Lotus Development Corp. 1-2-3.

Pricing for HP Information Access, supporting 10 PCs, ranges from $5,900 for the HP Micro 3000 to $12,500 for larger processors. HP Resource Sharing, supporting 10 PCs, is priced from $4,800 for the Micro 3000 to $9,500 for higher end processors.

For further information, contact Hewlett-Packard Co., 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Circle Reader Service Number 316

Novell Netware Touts Greater Data Protection

OREM, Utah — Novell, Inc. has introduced System Fault Tolerant (SFT) Netware Level II, an operating system aimed at providing a higher level of data protection for local-area networks (LAN).

Novell said SFT Netware Level II contains two options beyond Level I that protect shared LAN data against loss or contamination due to system hardware failure.

The first option is disk mirroring, which enables the user to duplicate disk drives containing critical data that must be ensured against loss or contamination.

With disk mirroring, if data cannot be read from one disk drive it is read from its mirror disk drive while the problem is corrected on the original drive. If a disk drive fails completely, it is shut down and the other drive takes over, the company said.

Transparent to the user

Novell said all this activity is transparent to the user and to the application software.

The second option is the Transaction Tracking System, a product that the company said ensures against interruptions or failures in LAN hardware from causing partially updated portions of data to contaminate or destroy the LAN data base.

In some network installations, according to the company, users may choose to use both disk mirroring and the Transaction Tracking System, the level of necessary protection being determined by the specific needs of each particular network installation.

SFT Netware Level II is priced at $3,995.

For further information, contact Novell, Inc., 748 N. 1340 W., Orem, Utah 84057.

Circle Reader Service Number 315

COMMUNICATIONS PRODUCTS

Gateway Ties Mainframe VM With DEC Units

FREMONT, Calif. — Interlink Computer Sciences, Inc. has introduced IBMVM/Decnet Gateway, which integrates mainframes running IBM's VM operating system with Digital Equipment Corp. computers.

IBMVM/Decnet Gateway enables users to access data residing on a DEC computer from an IBM CMS interactive, CMS batch or ISPF environment. It allows the mainframe user to send and retrieve sequential files to and from Decnet nodes, submit jobs to DEC batch and print queues, display data from DEC systems on a CMS terminal and change and delete files.

For bidirectional communications, Decnet users can access CMS minidisk files, VM batch subsystems and printer spool queues through the gateway's Digital-Initiated File Transfer (DFT) utility. Users can access IBM data at the record level to edit specific information or the entire file. File creations, updates and deletions reportedly appear to the Decnet user as if they were being executed in a native Decnet environment.

IBM Remote Spooling Communications Subsystem (RSCS) functionality grants peer-level-compatible access to nodes within a Decnet environment from the RSCS network for store-and-forward file transfers. IBMVM/Decnet Gateway also supports on-line command and message passing as well as electronic mail.

IBMVM/Decnet Gateway is currently available in two versions. A low-end 100K bit/sec. gateway with eight logical links is priced from $40,000 to $60,000. A high-end 500K bit/sec. gateway with 16 to 32 logical links ranges from $65,000 to $130,000.

For further information, contact Interlink Computer Sciences, Inc., Suite 203, 39055 Hastings St., Fremont, Calif. 94538.

Circle Reader Service Number 317

Have more Dial-In PCs than your System/3X can handle?

Dial-in more PCs on the twinax channel, and save money!

PCs with emulation boards are limited in how many you can dial-in

With emulation boards, each PC takes up one comm line while dialing-in. When you run out of comm lines, you can't dial-in any more PCs. Period. Local Data's InterLynx™/5251 directly attaches to the twinax channel so you can dial-in up to 7 PCs on the same port!

Dial-in on the twinax channel without a board

By not using a board, you don't pay the high cost for comm ports, a comm adapter, or comm overhead on your System/3X. With TruLynx™/5251-PC software running on your PC, you can dial into the twinax and use less expensive asynchronous modems, too. TruLynx is a software product, so it's easy to install, and doesn't take up a valuable PC board slot.

File transfer compatibility with PC Support/3X or FSU

TruLynx allows you to transfer files to and from the System/3X with PC Support/3X and FSU. You can work with host data in your favorite PC application, like Lotus 1-2-3®

Local Data makes dial-in easy, and protects you from accidental disconnection

TruLynx gets you into the System/3X easily with its auto-dial and auto sign-on capability. Once online, if you are accidentally disconnected, InterLynx maintains your host session until you dial back. If you happen to walk away without signing off, InterLynx has an optional inactivity disconnect so phone bills don't eat up your budget.

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CIRCLE READER SERVICE NUMBER 242

Modem Connects IBM PCs To Minis

BILLERICA, Mass. — Ideassociates, Inc. announced the Ideacomm 5250/Modem software communications package and enhancements to Ideacomm 3278 and 5251.

Ideacomm 5250/Modem links IBM Personal Computers, PC ATs, XTs and portables to remote IBM System/34, 36 and 38 installations via an internal synchronous modem.

To make the PC-to-minicomputer connection, users need the 5250/Modem software and either a 2,400 bit/sec. UDS Sync-Up 201 or 4.8K bit/sec. UDS Sync-Up 208 internal synchronous modem from Universal Data Systems, Inc.

Ideacomm 5250/Modem supports a range of file transfer options including IBM's PC Support/36 and 38 and third-party packages.

Emulates IBM controllers

The product also emulates several IBM products including IBM 5251 Model 12 or 5294 cluster controllers and the IBM Enhanced Keyboard.

In addition, it provides complete monochrome or color 5250 terminal emulation for IBM 5251 Model 11, 5291 and 5292 Model 1 terminals.

The package also includes a documented programmatic interface that allows users to customize software for use with Ideacomm 5250/Modem as well as diagnostics and status utilities to verify proper functioning of the link. Ideacomm 5250/Modem is available now for $695.

Enhancements

Ideassociates also introduced enhancements to its Ideacomm 3278 local PC-to-mainframe communications package, including support for IBM 3278 Model 5 terminal emulation.

Ideacomm 3278 allows the PC to duplicate the functions of an IBM 3278 or 3179 terminal through local access to an IBM mainframe.

The enhanced version of Ideacomm 3278 provides 132-char. by 28-line full-screen support for 3278 Model 5 terminal emulations and full seven-color support for IBM 3170 terminal emulation.

It allows users to choose among several keyboard layouts including the IBM Enhanced Keyboard, Digital Communications Associates, Inc.'s Irma keyboard and Ideassociates' Idea keyboards. Ideacomm is immediately available for $995.

The company also announced enhancements to its Ideacomm 5251 board for PC-to-IBM System/34, 36 and 38 communications.

The enhancements include IBM 5292 Model 2 terminal support and 132-char. by 28-line full-screen support for its existing 3180 terminal emulation as well as a screen capture feature.

In addition, enhancements to Ideacomm 5251/Share, a software package that allows four PCs to access the System/34, 36 and 38 through one emulation board installed on a server PC, permits users to access terminal and printer emulation sessions.

Ideacomm 5251 retails for $895, and 5251 is priced at $495. Both are immediately available.

For further information, contact Ideassociates, Inc., 29 Dunham Road, Billerica, Mass. 01821.

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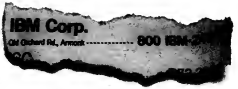

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Now call the people on the left, and you can emulate some terminals, a limited number of system printers, and not all of the 5250 display attributes. Of course you'll be able to work with IBM file transfers, but once the goods are delivered, can you work with virtually no support of PC based products?

So before you call the number on the left by force of habit, consider who's really giving you the best solutions in 3X communications. And ask yourself this.

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CIRCLE READER SERVICE NUMBER 238

Telenet Announces PC Telemail Package

RESTON, Va. — Telenet Communications Corp. has introduced PC Telemail, an electronic messaging software package for personal computers.

PC Telemail uses pop-up menus and function keys and, according to Telenet, can be learned quickly by novice users, with real-time help available at every point in the program. The package enables users to compose messages interactively or off-line using a built-in word processor. Users can also compose batch messages and place them in an electronic out box to be sent at a predetermined time.

Telenet added that PC Telemail allows users to send spreadsheets, documents, software files and graphics files that, when received, can be edited and revised. File transfer is done with local error detection and correction through the local Microcom, Inc. MNP networking protocol. The local MNP works in conjunction with the MNP protocol within Telenet's Public Data Network.

Documents created on PC Telemail can be sent by a variety of means, including Telenet's Telemail electronic messaging service, Telemail Telex and Telemail Xpress.

PC Telemail was designed to run on IBM and IBM-compatible Personal Computers. It requires a minimum of 256K bytes of main memory and can be used with monochrome or color graphics.

PC Telemail is priced at $150 for a single diskette, including documentation.

For further information, contact Telenet Communications Corp., 12490 Sunrise Valley Drive, Reston, Va. 22096.

Circle Reader Service Number 319

DA Systems Rolls Out Network Tools

CAMPBELL, Calif. — Three software packages that are aimed at making computer communications simpler and more cost effective have been introduced by DA Systems, Inc.

The Isobridge, the Hub and the Node software packages run on DA Systems' Dasnet wide-area network, a distributed, peer-to-peer network of IBM Personal Computers, IBM PC ATs and compatibles. According to the company, Dasnet makes it easy to send electronic mail and ASCII or binary files to other users running Dasnet software.

The three new software packages run on QNX, which is a Unix-based multiuser operating system, IBM PC-DOS or Microsoft Corp. MS-DOS.

The company said the Isobridge software and Dasnet local loop can communicate with one another, while the Node packages communicate with other Node software and the rest of the Dasnet through the Hub software.

Directory guides users

The software packages enable anyone on Dasnet to be addressed by computer name and user name, which can be found in a directory published by DA Systems.

After entering an E-mail message or file transfer request, the software handles the transmission without manual intervention, according to preset user specifications.

DA Systems added that built-in security measures protect data from unauthorized access or transmission on the network, and Dasnet commands and control files can be used to implement networked software applications.

Prices for the software packages range from $39.95 (requiring Hub access) through $1,390.

For further information, contact DA Systems, Inc., 1503 E. Campbell Ave., Campbell, Calif. 95008.

Circle Reader Service Number 320

Fiber-Optic Line Out For Fox LAN

DAYTON, Ohio — Fox Research, Inc. unveiled a line of fiber-optic products for the Fox 10-Net local-area networking system.

The 10-Net Fiber Optic Board was designed for 1M- or 2M-bit transmission speeds and uses the Ethernet protocol. It can be used either with the traditional 10-Net fiber-optic cabling or standard 10-Net twisted-pair wiring. Running with 10-Net networking software, the board reportedly provides all the 10-Net 3.1 local-area network functionality, the vendor said.

The 10-Net Fiber Optic Hub, a central processor that houses the network software and directs communications, resembles an AT&T Starlan hub and accommodates up to eight nodes. The hub also has a ninth connection that allows users to link hubs together. It operates at distances of two kilometers.

Links to fiber-optic cabling

The 10-Net Fiber Optic Repeater enables users to connect an established 10-Net cluster to fiber-optic cabling. It contains one connection each for fiber-optic and twisted-pair cabling.

The 10-Net Fiber Optic Repeater is currently available on a custom-order basis for $795. The 10-Net Fiber Optic Board, priced at $995, and Fiber Optic Hub, which sells for $1,995, are scheduled for general distribution in the first quarter of 1987.

For further information, contact Fox Research, Inc., 7016 Corporate Way, Dayton, Ohio 45459.

Circle Reader Service Number 321

Voice Computing Launches Voice Mail System

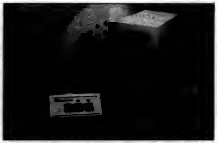
MADISON, Wis. — Voice Computing, Inc. rolled out Voiceline, a voice mail system for IBM Personal Computers or compatibles.

Voiceline automatically records messages if the user is out, selectively screens and forwards calls, monitors two telephone lines and operates continually even when the power to the computer is turned off. Users can also use Voiceline to record a message to someone; Voiceline then delivers the message at a predetermined time.

Voiceline runs on an IBM PC or compatible running Microsoft Corp. MS-DOS 2.1 or above. While Voiceline runs with a minimum memory of 256K bytes, the vendor recommends using 512K bytes. Voiceline is available at a suggested retail price of $1,295.

For further information, contact Voice Computing, Inc., 1250 Femrite Drive, Madison, Wis. 53716.

Circle Reader Service Number 322



Voiceline mail system features a directory and built-in clock.

CSI Offers SNADS Interface Product

SAN JOSE, Calif. — Communications Solutions, Inc. (CSI) added IBM Systems Network Architecture Distributed Services (SNADS) to CSI's Access line of communications software.

The product is a portable implementation of IBM's SNADS, an architecture for asynchronous or delayed program-to-program communications.

Access/SNADS interconnects IBM and non-IBM systems with IBM's electronic mail and offers document distribution that supports IBM's Document Interchange Architecture.

Tailored to Unix environments

Written in C for AT&T Unix System V, the software reportedly can be tailored to other Unix proprietary multiuser and local-area network environments.

Access/SNADS provides the basic software interface required to implement the document distribution function of an office system node such as IBM's Distributed Office Support System, System/36, System/38 and 5520 administrative system. It supports E-mail, document distribution, data base updates and software distribution.

Priced at $350 to $400 per node, Access/SNADS will be available by the end of the first quarter in 1987.

For further information, contact Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129.

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Telenet's dynamic alternate routing provides greater reliability than single-path leased lines. Our superior diagnostics facilitate fast problem isolation and repair. Plus monthly reports allow you to cost out departmental usage. And our built-in error checking assures data accuracy. Telenet has developed and installed more than 70 dedicated networks. We operate the world's largest public data network supporting over 1000 virtual private networks. And we're ready to help your company grow. For more information, have your computer call ours today.

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- At USER NAME? type IBM.ACCESS press CR.
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Or call us at 1-800-TELENET. Or send us your name and address via Telex: 248419.

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CIRCLE READER SERVICE NUMBER 234

COMMUNICATIONS PRODUCTS

Systems Strategies Releases Portable IBM DIA, DCA Versions

NEW YORK — Systems Strategies, Inc. has announced CDIA and CDCA, document distribution and text formatting software packages.

The firm said CDIA and CDCA are portable implementations of IBM's Document Interchange Architecture (DIA) and Document Content Architecture (DCA) that let non-IBM systems access IBM's Distributed Office Support System (Disoss) to perform electronic mail, document distribution, library services and remote application services.

Systems Strategies said that with CDIA, non-IBM systems are able to send, receive and exchange documents as a source/recipient node with IBM office automation systems and also request task execution. Systems using CDIA can communicate with either a mainframe running Disoss/370 under IBM CICS or with an IBM System/36 running Personal Services/36 software. Documents are transported between systems in a program-to-program manner using Systems Strategies' CSNA/LU6.2 products.

Written in C

The company added that both CDCA and CDIA are written in the C programming language. The software reportedly can be rapidly ported to Unix-based systems and easily adapted for other operating systems.

Both CDCA and CDIA are packaged together in one unit. Units are priced at $220 each.

For further information, contact Systems Strategies, Inc., 225 W. 34th St., New York, N.Y. 10001.

Circle Reader Service Number 324

Pcox Brand Gateway From CXI Bows

PALO ALTO, Calif. — CXI, Inc. has introduced its Pcox/GW-5250 Gateway, which connects an IBM Token-Ring or any other IBM Netbios-compatible local-area network (LAN) to IBM System/34, 36 and 38 minicomputers.

The product enables LAN-attached personal computers to function as IBM 5250 display stations or host-addressable printers.

CXI said the Pcox/GW-5250 Gateway emulates a remote IBM 5251 Model 12 display station operating via an IBM Systems Network Architecture/Synchronous Data Link Control (SDLC) link. The product supports concurrent emulation of a combination of up to nine host display and printer sessions, the vendor said.

The company claimed that as many as five of the nine sessions may be accessed concurrently from a single IBM PC situated on the LAN. Multiple gateways may also be installed on the same LAN to provide access to more than one System/34, 36 or 38 host.

No location restrictions

Because the Pcox/GW-5250 is connected to the minicomputer via synchronous modem, it eliminates location restrictions, CXI claimed. A gateway-equipped LAN may be located, for example, in the same room as the minicomputer or wherever telephone service is available. The company added that Pcox/GW-5250 also supports an optional file transfer facility for users who need to upload and download data between the PC and the host.

The Pcox/5250 package includes the SDLC adapter board, gateway software and user documentation. Four Pcox/5250 Gateway-WS workstation software kits are also included.

Pcox/GW-5250 is priced at $1,725, and additional workstation software kits are priced at $200 each.

For additional information, contact CXI, Inc., 3606 W. Bayshore Road, Palo Alto, Calif. 94303.

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NEWS ANALYSIS

VIDEOTEX from page 7

management systems."

According to Bernell Wright, vice-president of the electronic services practice at Link Resources, "Videotex is part of the whole [corporate computing] trend toward distributed data bases and processing, away from remote data bases," Wright explains. "Half of the U.S. corporate videotex market consists of [IBM] Personal Computer owners who are not using their machines because they have trouble getting the right information from data bases."

Painless interaction

Wright explains that one of the major attractions of videotex is its ease of use and the simple dialogue established between user and data. He adds that videotex is part of a current movement, which includes artificial intelligence and expert systems, trying to make the interaction between management users and data as painless as possible.

VIA's Smith says another push behind videotex is a new awareness on the part of Digital Equipment Corp. and IBM of the potential of videotex for corporate clients. DEC, with its VTX videotex product, is leading the U.S. videotex vendor pack with about 85% of the current corporate videotex market, according to Link Resources.

In response, IBM has stepped up its own videotex offerings, providing color videotex support across its PC and 3270 terminal lines.

Moody's videotex system

"We use videotex to create and update on-line credit reports on municipal bonds for our clients," explains John Hegner, director of systems development at New York-based Moody's Investors Service. "It's important that the reports be updated quickly before the bonds are posted in the marketplace."

Hegner says Moody's clients use DEC's VTX videotex facility running on a DEC VAX-11/785 minicomputer over an Ethernet network and accessed through DEC VT100 terminals and IBM PCs. Moody's credit report software, which provides updated videotex data, was purchased from a third-party software house. Through DEC protocol conversion software, videotex users can also extract data from the IBM 4381 mainframe. "Videotex is letting us do in half an hour what used to take five to 10 days," Hegner says.

Link Resources' Wright adds one final but important attraction with videotex: "It's an application that cuts across all functional boundaries. Anyone can use it."

S.K.

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News section compiled by Computerworld Focus *staff members Stan Kolodziej, Michael Tucker and Rebecca Hurst.*

UPDATE from page 7

products like Macnix and Tops is likely to be in research, engineering and design departments in which users work on Macintoshes to off-load the Unix host.

Report Studies Overseas Telecom

Users should be able to take advantage of lower transmission costs in some overseas telecommunications but may face rising costs in others, a Diebold Group, Inc. study concluded.

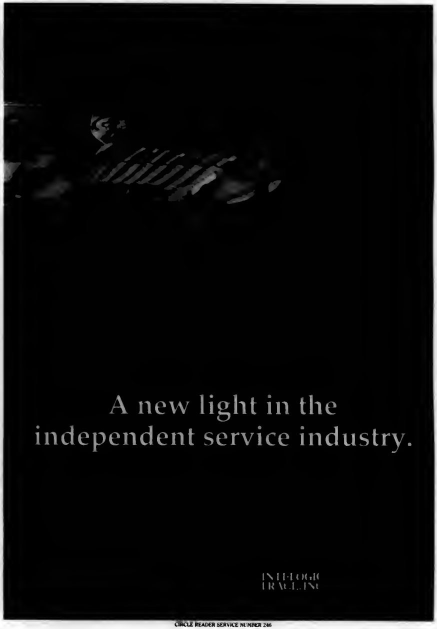
The breakup of the Bell system in the U.S. and deregulation of telecommunications services appears to have started a trend toward deregulation and privatization around the world, Diebold reported. Japan and the UK have already begun rewriting the rules that regulate their telecommunications services. In addition, firms such as MCI Communications Corp. and GTE Sprint Communications Corp. have been offering cut-rate international phone service, the Diebold report said.

However, such rate tactics are expected to have little effect at the international level where there is a controlled monopoly, the research company asserted.

Many countries have made no effort to deregulate their telecommunications services, and rates in these nations are expected to rise.

In addition, countries such as West Germany continue to protect their national Postal Telegraph and Telephone (PTT) organizations, providing laws that give PTTs a monopoly on providing services, the report said. At times, the PTTs may hinder technological progress and inhibit growth by preventing firms from using the newest technologies, Diebold stated.

R.H.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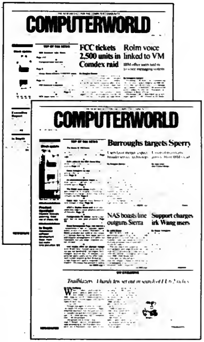

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